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# SENDOC bulletin I

## Part I: Industry and Technology

Volume IX Number 1 January 1981

Editor
Dr. JB Subramaniam

Associates
Datta Reddy KS
Seetharam MV
Senguttuvan S
Spurgen C
Subba Rao M
Sudhakara Rao BS
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Volume IX Number 2 February 1981

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## Part I: Industry and Technology

Volume IX Number 10 October 1981

Editor
Dr. J.B. Subramaniam

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Seetharam, M.V
Senguttuvan, S.
Spurgen, C.
Subba Rao, M.
Sudhakara Rao, B.S
Vishwas Rao, V.

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II New Machinery and Equipment 9-12
III Industry Roundup 13-21
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V SENDOC Services 32-33

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Dr. J.B. Subramaniam

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# New Products and Processes

## CHEMICAL INDUSTRIES

### Bromine from Sea Bitterns

Bromine is one of the most valuable chemicals which can be recovered from sea water and sea bitterns. Bromine compounds are widely used as anti-knocking agents in the manufacture of aviation fuel. They are extensively required for the manufacture of dyes, dye intermediates, photographic chemicals, fumigants and fire-proofing formulations.

The Central Salt and Marine Chemicals Research Institute, Bhavnagar has developed a process to recover bromine from sea bitterns. Sea bittern (29° to 30° Be') is acidified to adjust the pH at 3 to 3.5 and preheated in heat exchanger to 85° to 90°C. The hot bittern is run through a packed tower from the top counter-current to chlorine and low pressure steam which are introduced slightly above the bottom of the tower at suitable rates. Bromine gets liberated in the vapour form, which is condensed, collected and purified.

The process has been studied on a pilot plant having a capacity of 45 tonnes of bromine per annum.

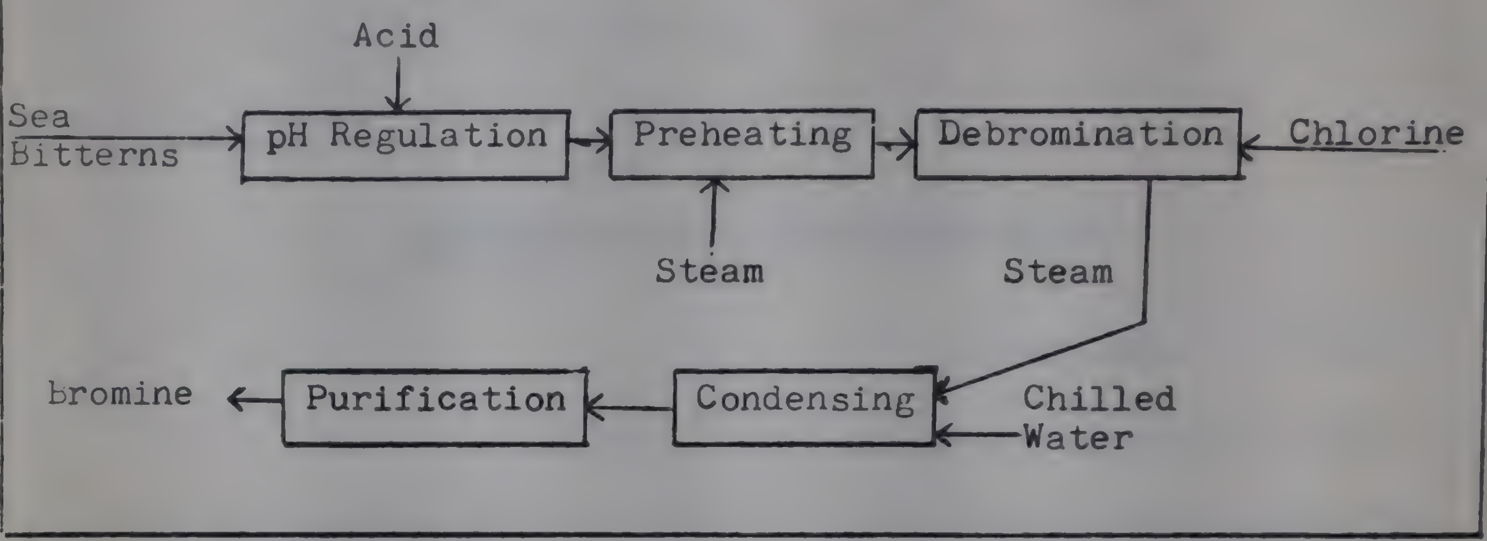
Sea bitterns, sulphuric acid and chlorine are the main raw materials required in the process. All these are available in the country.

Heat exchanger, debromination tower, chilling plant, boiler, tantalum condenser, pumps are the main items of equipment. All these are available indigenously.

It is estimated that a plant having a capacity to produce 90 tonnes of bromine per annum will cost Rs.1 million, excluding land and buildings. The plant would require 25 persons.

The process has been licensed to 7 parties and most of these are in various stages of implementation.

BLOCK FLOW DIAGRAM FOR BROMINE FROM SEA BITTERNS


Acid
Sea Bitterns
pH Regulation
Preheating
Debromination
Chlorine
Steam
Steam
Bromine
Purification
Condensing
Chilled Water

## Zinc Rich Primer

Zinc rich primers in organic medium may find application in the protection of steel structures in marine and industrial environments.

Zinc pigmented paints in organic medium are being produced in the country. However, these paints use zinc contents up to 75-80%.

With the above object in view, the Central Electrochemical Research Institute, Karaikudi has developed an improved zinc pigmented paint in which the zinc is partially substituted, the performance of which is better than the products in use. The process consists in incorporating zinc dust in epoxy polyamide or chlorinated rubber medium. The mixture is then ground well to form uniform paste and adjusting the consistency with solvent to form a brushable primer.

The process has been studied on 2 kg per batch and about 10 kg of the product have been prepared in the laboratory.

Zinc dust, epoxy/polyamide chlorinated rubber, chlorinated paraffin wax and xylene are the main raw materials. All are available in the country.

The equipment needed are: Mixer with ½ HP motor, Mixing tanks, Thickness tester, Adhesion tester, Stainless steel tanks, Balance.

The capacity of minimum economic unit has been suggested to be 150 TPA (one shift 8 hours). The capital investment required to put up such a plant has been estimated at Rs.9.51 lakhs. The breakup is as under:-

| | | Rs. |
|---|---|---|
| 1) | Fixed capital on building | 60,000 |
| 2) | Fixed capital on plant | 56,000 |
| 3) | Working capital | 9,31,095 |
| | Total | 9,51,595 |

The cost of production has been worked out to be Rs.18,465 per ton.

## Zinc Sodium Silicate Primer

Primers are used for the protection of steel surfaces exposed to atmosphere. Red oxide, zinc chromate, red lead are the commonly used primers. However, these primers are not intended to give protection by themselves as these have to be followed by finishing paints.

Keeping in view the draw backs of the conventional primers, the Central Electrochemical Research Institute (CECRI), Karaikudi has developed a process for the preparation of zinc sodium silicate primer for protection of all types of steel structures in marine environment. The process consists in reacting zinc dust with sodium silicate and red lead is added. The whole mass is ground to form a uniform paint and adjusting the consistency with water to form a brushable primer. The primer can be applied in humid atmosphere and on metal surface even under wet conditions. The hard and abrasion resistent coating formed on the surface can be easily removed by acidic wash. The process has been studied on 3 kg per batch.

Sodium silicate, zinc dust, red lead and deionised water are the main raw materials required in the process. All are available indigenously.

The items of equipment are: Deionised water unit, Mixer with ½ HP motor, Mixing tank, Thickness tester, SS Tank, Balance. All the items are available indigenously.

The capacity of the minimum economic unit has been suggested to be 150 MT per annum (one shift 8 hours). The capital investment required for setting up a plant is as under:

| | | Rs. |
|---|---|---|
| 1. | Fixed capital on building | 60,000 |
| 2. | Fixed capital on plant | 63,250 |
| 3. | Working capital | 6,28,890 |
| | | 7,52,140 |

The cost of production has been worked out to be ₨.15,974/- per ton.

## ELECTRONICS AND ELECTRICAL INDUSTRIES

### Condenser Microphone

The Central Electronics Engineering Research Institute, Pilani, Rajasthan has developed a method to manufacture condenser microphones. The method has been patented under the Indian Patents Act (Patent No. 104209) and is available for commercial exploitation.

In conventional methods of manufacture, the clamping arrangements of diaphrams are found to be critical. If not handled with skill and great care, the end product suffers in performance and quality. This major difficulty has been removed in the present method, consequently leading to better productivity and profitability.

Special arrangements have been made to give the diaphram the required all round tension in a simple manner and to have good parallelism between electrodes and the diaphram.

Based on this method, the institute has made about 25 prototypes which have been tested and sold to different institutions and laboratories.

Specifications:

| | |
|---|---|
| Frequency response | 40 Hz - 18 kHz (± 2dB) |
| Sensitivity | -60 dB re. 1 Volt/micro bar |
| Directional characteristics | Omnidirectional |
| Impedance | 600 ohms or high |

Instrument lathe, fly press, drilling machine, moulding machines, jigs, fixtures and other tools are required for manufacture of the microphones. All these are available indigenously.

For testing purposes, the equipments required are: Audio oscillator, reference condenser microphone/amplifier, microphone amplifier, power amplifier, anechoic box, VTVM, Level recorder etc. Of these, reference condenser mike, mike amplifier and level recorder may have to be imported. Others are available indigenously.

Brass rods/tubing, MS rods/tubings, nylon foils, plastic materials, cables, connectors, subminiature pentode etc. are the raw materials/components needed. The pentode may have to be imported, while others are available indigenously.

At present these types of condenser microphones are being imported. Future demand is expected to be about 500 Nos per year.

For the manufacture of 500 Nos. of condenser microphones per annum, the investment needed are:

| | |
|---|---|
| Fixed capital (excluding Land & Building) | ₨. 1.1 lakhs. |
| Working Capital | ₨. 0.5 lakhs. |

Terms of know-how transfer:

| | |
|---|---|
| Lumpsum premium | ₨.5,000/- |
| Recurring royalty | 1% |
| Nature of licence | Non-exclusive |
| Period of licence | 5 years |

## Digital Master Clock System

Time keeping in the studio centres and the associated offices of All India Radio stations is very important. For this purpose, a slave clock system synchronised to one master clock is considered necessary. At present, All India Radio employs an imported mechanical master clock having an accuracy of ± 1 sec/day to drive the slave clocks system. In order to improve the accuracy of time, a crystal controlled digital clock has been developed by the Research Department of All India Radio, New Delhi.

The Research Department has developed two models of digital master clock system. The digital master clock alongwith the relay driver, subtransmiting relays and chain of seconds and half minute clock forms Model-1 system. The digital master clock alongwith an electronic solid state slave driver and chain of seconds and half minute clock forms Model-II system.

### Technical Specifications:

Digital Master Clock Unit (Model-I & II)

| | |
|---|---|
| Basic Frequency Standard | 100 KHz crystal in a thermostatically controlled oven. |
| Frequency stability | Better than 5 PPM |
| Time Display | Seven segment LED display |

| | |
|---|---|
| Time synchronisation | Can be locked with AIR time signal (or)/any other primary standard. |
| Controls (1) | Time set facility viz. set seconds, minutes, hours slow (advance), hold arrest and Re-set. |
| Outputs (1) | 1 sec. pulse of TTL level |
| (2) | Half-minute pulse of TTL level |
| Power Supply | |
| (i) Voltage | + 18 V ± 20%, 160 AH (Lead-Acid, ACC, 3 x 6V) |
| (ii) Current | 1-4 A (Nominal) |
| Operating Temp. Range | Preferable to operate in airconditioned (10°C to 45°C) place. |
| Mounting | Rock Mounting |
| Dimensions (mm) | 482 (L) x 223 (H) x 284 (B) |
| Weight | 8 kgs, approx. |

### Slave Clock Driver for Model-I

| | |
|---|---|
| Input (a) | 1 sec. pulse of TTL level. |
| (b) | Half minute pulse of TTL level. |
| Controls (a) | Selection of seconds input |
| (b) | Power on/off for seconds & half minute stage. |
| (c) | Selection of half-minute input. |
| Output (a) | Seconds master relay contacts for actuating sub-transmitter relays. |
| Power Supply (a) | Voltage + 18 V ± 20% |
| (b) | Current 100 mA nominal. |
| Operating Temp. | In an air conditioned place |
| Mounting | Rack mounting type |
| Dimensions (mm) | 482 (L) x 88 (H) x 218 (B) approx. |
| Weight | 2.5 kg. approx |

### Slave Clocks Driver for Model-II

| | |
|---|---|
| Input (a) | 1 sec. pulse of TTL level |
| (b) | Half minute pulse of TTL level |
| (c) | + 5 V.D.C. Input from Master Clocks 1 and 2. |
| Controls (a) | Selection of Master Clock 1. |
| (b) | Output (or) Master Clock 2 output for 'sec' & half minute units 1 & 2. Power 'ON' switch for unit 1 & unit 2. |
| (c) | Output Selection Switch for units 1&2 for driving seconds & half minute Slave clocks. |

|  |  |  |
|---|---|---|
| Outputs | (a) | Seconds output for driving centre second slaves clocks. |
|  | (b) | Half-minute output for driving half-minute slaves. |
| Power | (a) | Voltage + 24V, D.C. ± 20% |
|  | (b) | Current 50 mA, nominal-No load, current increases depending upon load capacity. |
|  | (c) | 0.5 A(max) for 40 seconds and with a peak of 1.2A (max) for 40 half minute slaves. |
| Operating Temp. |  | 10°C to 45°C |

## Slave Clocks (With Digital Display):

### General

Precise display of time in seconds, minutes & hours. The slave clock can have only hours & minutes but should be driven from the Master Unit. The technical specifications are given below.

### Specification

|  |  |  |
|---|---|---|
| Input | (i) | 4.5 VP-P, 1 sec pulses<br>(OR) |
|  | (ii) | 50 Hz, TTL level. |
| Letter height | (i) | Display height 2 "or 3" indicating hours, minutes & seconds. |
|  | (ii) | "Seconds" display arranged in a circular fashion by 60 LEDS, with hours & minute's indication at the Centre |
| Control | (i) | Advance, Hold & Reset. |
|  | (ii) | Facility to control the slave clocks from master unit. |

External synchronisation of 'Seconds' feasibility from a master clock apart from individual second zero-set facility. (This would enable all slave clocks to get synchronised with that of master Unit).

| | |
|---|---|
| Power Supply | Mains 240 ± 10%, 50 Hz ± 2% with changeover facility to 12 V/24V supply without any break. |

The estimated demand is expected to be about 40 (forty) units immediately during the next five years by All India Radio. Other organisations like P & T, Railways etc. may also incorporate this system in their network.

The main components required are integrated circuits, transistors, zener diode, diode, electrolytic, disc and variable type condenser, harp type connector, printed circuit board, trim potentiometer and heat sink. All these components are available indigenously.

The manufacturer should have sufficient technical background, experience and standing in the production of professional grade systematised general electronic equipment. If the firm is making general electronic equipment, then no other special machinery is required for the above system.

Test Instruments

| | |
|---|---|
| Indigenous | i) Dual trace Oscilloscope (0-5 MHz) B.W.<br>ii) Dual DC power supplies (30 V, 2A)<br>iii) Multimeter 20,000 ohms/volt.<br>iv) Logic probe & pulser for quick servicing |
| **Imported** | Nil |

Cost of Production

| | | Rs. |
|---|---|---|
| a) | Cost of Digital master clock | 3,300 (approx) |
| b) | Cost of relay driver unit | 900 -do- |
| c) | Slave driver for one unit | 600 -do- |

Electrostatic Emulsifier

Research by Dr J F Hughes and Mr I Pavey in the Department of Electrical Engineering at the University of Southampton has demonstrated an improved method of emulsification through the use of electrostatic forces. A pilot-scale model has been built.

Many manufacturing processes in the field of domestic products, cosmetics, pharmaceuticals and the paint industry involve emulsification of two or more liquids. Emulsification is defined as the dispersion in fine particles of one liquid into another liquid, the two liquids normally being immiscible.

This process is especially important for pressure-packaged aerosol products such as wax polishes, where a small percentage of the product needs to be evenly and finely distributed over a wide area. If the dispersed particles are small enough (typically 1-2 um in diameter), then most emulsions are reasonably stable over a prolonged period of time. This is particularly important in the case of commercial products, which must have a reasonable shelf life.

Normal practice during emulsification preparation is to pour the first liquid into a violently agitated sample of the second liquid. This normally produces an emulsion with particles of the order of 50-60 pm diameter. The final stage of the process involves mechanical atomisation of the primary emulsion, which in turn breaks the particles down to sizes of the order of 1-2 pm diameter. Presently available emulsifiers provide insufficient control over particle size and, as would be expected, the particle size distribution also varies considerably. This wide particle size distribution often results in instability of the product which can lead to 'creaming' or 'gelling'.

The University of Southampton has invented a method of electrostatic emulsification whereby a high direct voltage (40 kV) is applied to the first liquid as it emerges from an emitter nozzle. The effect of the induced charge is to cause the liquid to break up to produce an atomised spray which is then fed into a thin, moving layer of the second liquid,

A three-year development programme financed by NRDC has been successfully completed and this shows that a satisfactory emulsion can be produced by electrostatic means at a rate comparable with methods at present in use by commercial enterprises.

Technical feasibility was first established using a laboratory model which demonstrated that it was possible to make an emulsion with the required particle size distribution and concentration in small quantities. Subsequently a pilot-scale emulsifier with an oil phase flow rate of 350 grams per minute and a total emulsion capacity of at least 5 kg was designed and constructed.

Patent applications have been filed by NRDC covering aspects of the emulsifier design and the collaboration of industrial companies able to commercialise this invention is now being sought.

Companies interested in manufacturing emulsifiers based on this work under NRDC licence are invited to contact Peter Thompson, Computers, Systems and Electronics Group, NRDC, Kings gate house, 66-74 Victoria Street, London, UK, who can arrange demonstrations of the pilot-scale emulsifier at the University.

Microwave Components for Portable Radars Comprising of Coaxial Circulators, Waveguide to Coaxial Adapters and Co-wave Circulators.

## Circulators, Adaptors, Coware Circulators

Circulators are used as dúplexers in transponders and isolating devices in low noise RF amplifiers which are employed as front ends in microwave receivers to improve the sensitivity performance. They can also be converted into high ratio isolators and signal samplers by terminating the unused parts with matched terminations.

Waveguide to coaxial adapters are used for connecting waveguide transmission line to coaxial transmission line. Cowave circulator is used for connecting waveguide and coaxial transmission lines and in addition this device has an inbuilt circulator which makes it useful in portable radar systems.

## Circulators

Circulators are three port or multiport devices which allow microwave power fed in one port, to get transmitted to the next port with minimum losses in one direction only but introduce very high transmission losses in the reverse direction. For example, in a three port circulator signal entering port 1 is passed on to port 2 with minimum losses. The power that leaks to port 3, is minimum. When the signal is passed on to port 3 from port 2, the power that leaks to port 1 is minimum. The same is true when signal enters port 3. The direction of power transmission is specified. A four port circulator consists of a pair of three port circulators cascaded to give still high transmission losses in specified reverse directions. Isocirculators/Isolators are basically three port circulators with isolated port terminated in matched termination internally.

## Adapters

Waveguide to coaxial adapters are devices which allow the transmission of microwave power from waveguide transmission line to coaxial line and vice versa with minimum reflection and transmission losses.

The device consists of a waveguide tubing shorted at one end and coaxial connector fitted to waveguide tubing. The centre conductor of the coaxial connector extends into the waveguide tubing. A dielectric transformer is used for impedance matching purposes. The dimensions of this transformer, diameter and position of the centre conductor of coaxial connector and inner dimensions of the waveguide tubing determine the frequency range.

## Cowave circulators

This device consists of circulator and waveguide to coaxial adapter (both described earlier). These two devices are integrated to make compact assembly by eliminating two connectors.

The Defence Electronics Research Laboratory, Hyderabad has fabricated 24 circulators, 36 waveguide to coaxial adapters and 2 cowave circulators. All these microwave components have been tested and their performance has been found satisfactory.

## Technical Specification

### 1. Coaxial Circulators

| | |
|---|---|
| Frequency Range (GHz) | 8.0-10.5 |
| VSWR (Max) | 1.22 |
| Loss dB (Max) | 0.3 |
| Isolating dB (Min) | 20 |
| Size (mm) | 20x24x17 |
| Connectors | SMA (F) |
| Temperature range | 0 to 55°C |

### 2. Waveguide to Coaxial Adapter

| | |
|---|---|
| Frequency range (GHz) | 8.0-12.4 |
| VSWR (Max) | 1.30 |
| Connector | SMA (Female) |
| Temperature range | 0 to 55°C |

### 3. Cowave Circulator

| | |
|---|---|
| Frequency range (GHz) | 8.5-9.6 |
| VSWR (Max) | 1.30 |
| Loss dB (Max) | 0.6 |
| Isolation dB (Min) | 20 |
| Connectors | SMA (Female) |
| Temperature range | 0 to 55°C |

The main raw materials required are polycrystalline garnets, aluminium alloy, ceramic permanent magnets, styrene-based dieelectrics, R.F. absorbing material, N type SMA panel connectors and terminations, M.S. plates, aluminium plates etc. All these raw materials except polycrystalline garnets, panel connectors, dielectric materials, terminations and R.F. absorbing materials are available indigenously.

## Equipment

### 1. Indigenous

Assembly guages, precision tools for inspection of mechanical features of the devices, standing wave ratio indicator for VSWR measurement, general purpose oscilloscope for display.

### 2. Imported

Sweep oscillator with R.F. plug-in, power meter with thermistor mount, broad band coaxial microwave components like variable attenuators, directional coupler, crystal detector, slotted section, adapters, precision termination, R.F. cables.

## Cost of production

Coaxial circulator : ₨.1040/- approximately
Wave Guide to coaxial adapter : ₨.440/- approx.
Co-wave circulators : ₨.148/- approx.

## Surface Acoustic Wave Devices

Surface acoustic wave devices provide VHF-UHF signal processing functions not readily available by other means. These devices have made a major impact in an exceptionally short time on the electronics industry in advanced countries.

The Indian Institute of Science, Bangalore has fabricated about 20 to 25 devices by conventional thin film and photolighographic techniques. These devices have been supplied to LRDE, Bangalore, I.I.T. Bombay and Radio Astronomy Centre, Ootacumund and their performance has been found to be satisfactory. The fabrication process consists of the following steps:

Vacuum deposition of a thin metal film on the substrate; Coating the substrate with photoresist; Exposing the photoresist to light through an appropriate photomask; Developing the exposed photoresist image; Etching of metal film; Stripping the photoresist and making electrical connections to the transducers.

These steps have been standardised in order to obtain good reproducible results.

## Specification of the product

### 1. Fixed and multiple-tapped delay lines

| | |
|---|---|
| Centre frequency | upto 500 MHz |
| Time delay | upto 25 micro sec. |
| Fractional bandwidth | from 1% to 25% |
| No. of taps | upto 63 |
| Insertion loss | 10 d B to 50 d B |

2. Linear F.M. 'Chirp' filters

| | |
|---|---|
| Centre frequency | upto 60 MHz |
| Bandwidth | upto 20 MHz |
| Time delay | upto 8 micro sec. |
| BT product | upto 160 |
| Sidelobe suppression | greater than 30 dB |
| Insertion loss | 35 dB to 45 dB |

3. Binary P.S.K. Filters

| | |
|---|---|
| Centre frequency | upto 30 MHz |
| Code lengths | upto 63 bits |
| Bit length | less than 35 nano-sec. |

These devices are not available indigenously. The present demand in the country is about 100 devices per annum. It is expected that with indigenous availability the demand will increase considerably.

The device can be used in instrumentation & signal processing systems, television and radar.

The main raw materials required are quartz crystals, photomasks, connectors, lithium niobate crystals and photoresists. Except lithium niobate crystals and photoresist, all other raw materials are available indigenously. Import content per unit is approximately Rs.200.00

The main equipment required for the fabrication of this device are vacuum unit, clean air bench & spinner. All these are available indigenously.

The main test instruments required for testing these devices are signal generator, pulse generator, oscilloscope and frequency counter. All these test instruments are also available indigenously.

Economics of the project

| | |
|---|---|
| Suitable Economic Unit | 30 devices/annum |
| Fixed capital | |
| 1. Land & Building | Rs.40,000/- |
| 2. Plant & Machinery | Rs. 1,00,000/- |
| Working capital | Rs. 20,000/- |
| Cost of production/Unit | Rs. 1500/- approximately |

## INSTRUMENTS AND INSTRUMENTATION

### Binocular Prismatic 7 x 50 to new Design

The device is used for clear observation of distant objects. At present this type of prismatic binocular is not available indigenously. The approximate demand is about 5000 units per annum and the present market price is about ₨.1600/-.

The optical system of the binocular comprises of a three-element telephototype objective so as to compress its length and 1-2-2 kapella eyepiece to cover the large apparent field of view. The porro prisms of first type are used as erectors. It contains three sub-assemblies; viz. (i) objective glass, (ii) prism plate carrying the graticule and (iii) cover plate circular in shape, which houses eyepiece and silica gel desicoator.

The three independent sub-assemblies are positioned in their respective positions, in the die-cast aluminium body. In actual practice, it is proposed to get these bodies pressure die-cast which would lead to reduction in weight and easy tropicalisation. All optics are bloomed to reduce the glare and hence to improve image contrast.

The other characteristics of this binocular are compactness, enhanced stereo-vision and provision of filters to the eyepiece to avoid glare and haze.

The Instruments Research & Development Establishment, Raipur, Dehradun, has developed two prototypes (Indian Patent No.141993) and their performance has been found satisfactory. It has also been approved by Armed forces of the country for their use.

Specifications of the Product

| | |
|---|---|
| Magnification | 7X |
| Field of view | 7 degrees |

The main raw materials components required are optical glasses, aluminium brass, optical cements, silica gel sealing material, rubber, filter glass and plastic. All these raw materials except filter glass, optical cement and one variety of optical glass are available indigenously.

Optical grinding and polishing machines, edging machines, lathe, milling machine, anodising chamber etc. are the equipment required all of which are available indigenously. The cost of production per unit is about ₨.1200/-.

It is suggested that the production should be taken up by some industry manufacturing optical instruments.

## Dissolved Oxygen Analyser

This analyser is suitable for measurement of dissolved oxygen in effluents, water etc. The quantity of dissolved oxygen is an important parameter to be determined and controlled in applications like discharge of industrial effluents, water treatment for boilers, fermentation etc. where this equipment can find good use. Also other applications like sewage treatment/disposal, biological requirements for growth of fish etc. require the use of suitable dissolved oxygen analysers.

The Dissolved Oxygen Analyser developed by Central Scientific Instruments Organisation, Chandigarh is based on polarography principle. The senser consists of a gold electrode, a silver anode and a thin semipermeable membrance. This along with the liquid, in which oxygen is in dissolved state, forms the complete system for the measurement. The oxygen in the liquid, gets reduced at the cathode releasing electrons. This flow of electrons constitute a current and this is amplified by a current amplifier and a meter is used to indicate the quantity of dissolved oxygen.

The institute has made three instruments and these have been found to give satisfactory performance.

### Specification

| | |
|---|---|
| Range | 0-5, 0-10, 0-20 ppm. |
| Accuracy | ± 0.3 ppm |
| Response time | Depends on membrance thickness; with 0.5 mil membrance, 90% response can be obtained in 45 seconds. |
| Temperature Compensation | Manual, 10°C - 50°C |

Integrated circuits, resistors, potentiometers, transformers, switches, teflon membrane, gold, silver probes, capacitors, diodes, transistors, IC bases, PCBs, meter etc. are needed. All are available indigenously except ICs which are of imported origin. If direct imports of the ICs are desired, small industries should get DC (SSI)/DOE approval.

Since this is an assembly oriented product, production machinery required is not significant. Test equipments needed are: Digital multimeter, Avometer, constant temperature bath, refrigerator, Heating mentles, Magnetic stirrer, Aerator, etc. are needed. For calibration purposes, oxygen free nitrogen gas, deionised water, chemical laboratory glass wares, and chemicals are needed. All are available indigenously.

The institute has estimated a demand of 100 pieces per year for this instrument. The entrepreneur is however advised to make his own market survey.

Since the demand is low, it is preferable that an existing entrepreneur in a related line of manufacture takes on this product as an additional item. In such a case, the fixed capital indicated below, will have to be modified suitably taking into account the facilities already available.

For making 60 pieces per annum, the following investment is needed:

| | |
|---|---|
| Fixed capital (excluding land & buildings) | Rs.35,000 |
| Working capital | Rs.45,000 |

Terms of know how transfer

| | |
|---|---|
| Lumpsum premium | Rs. 6,000 |
| Recurring Royalty | 3% |
| Nature of licence | Non-exclusive |
| Period of licence | 5 years |

## 16 mm **Film** Editing Machine

The 16 mm film editing machine is a high quality editing machine having modernised facilities for editing 16 mm motion picture film and sound (separate magnetic perforated tape) tracks. Synchronisation of SEPMAG sound tracks to the picture and monitoring of composite sound picture (COM.MAG/COM.OPT) can also be done.

This is a four plate, flat-bed, motion-picture film editing and synchronising machine. The machine is designed for editing 16 mm motion picture film and sound tracks, and synchronising magnetic sound tracks to the picture. Facility of sound reproduction from both optical and magnetic sound tracks has been provided. Drive for the picture film and SEPMAG tape is through electromagnetic clutches, which can be disengaged to permit either of the two to run independent of the other. A motor operated differential synchroniser has been provided for advance/retard of SEPMAG sound tape with respect to picture film.

An electronically governed 0.5 KW D.C. shunt motor drive system has been provided for running the picture film and SEPMAG sound tape at synchronous, slow and fast speed in forward and backward direction.

Continuous (non-intermittent) projection system by means of a rotating 12-faced prism has been employed.

The sound pick up unit employ photodiode and magnetic heads. Two high quality monitoring amplifiers have been provided for reproduction of sound from optical/magnetic sound tracks on 16 mm composite film as well as from SEPMAG sound tape.

Development of 1st prototype model was completed in the Research Department of All India Radio, New Delhi in 1975. This was put to exhaustive field trials for over a year. The performance was found satisfactory. This model was installed at Doordarshan Kendra, New Delhi. Later on three more units with some further improvements were fabricated and supplied to Doordarshan Kendras at Madras, Lucknow and Calcutta.

## Specifications

### Electrical Section

### Motors

#### Main Drive Motor

| | |
|---|---|
| Power Rating | 0.5 KW |
| Voltage Rating | 220 V.D.C. |
| Base Speed | 2500 R.P.M. |
| Type | D,C.Shunt, designed for thyristor operation. |

#### Motor for Differential Synchroniser

| | |
|---|---|
| Power Rating | 25 Watts |
| Voltage Rating | 220 V. 50 Hz |
| Base Speed | 1350 R.P.M. |
| Type | Induction motor fitted with Electromagnetic clutch. |

#### Motor for separate rewinder

| | |
|---|---|
| Power Rating | 20 Watts |
| Voltage Rating | 220 V, 50 Hz |
| Base Speed | 1350 R.P.M. |
| Type | Induction Motor |

### Variable Speed Drive

Operating speeds in Forward/Backward directions

| | |
|---|---|
| Slow speed | 6 Frames/Sec. |
| Synchronous speed | 25 Frames/Sec. |
| Fast speed | 50 Frames/Sec. |

Regulation at Synchronous Speed

| | |
|---|---|
| Variation against plus minus 10% mains fluctuations: | ± 1% |

| | |
|---|---|
| Speed Regulation against load | ± 2% |
| Audio Section | |
| Output Level | 3 Watts. |
| Output Impedance | 8 ohms |
| Frequency Response | ± 1.0 dB from 30 Hz to 10 KHz |
| Harmonic Distortion | 3% |
| Noise Level | Better than 52 dB below rated output |
| Treble Boost/cut | 20 dB Max |
| Bass-Boost/cut | 20 dB Max |
| Power Supply | 230V, Plus-minus 15%<br>50 Hz.A.C. |
| Optical | |
| Projection lens | F: 3.5/50 mm |
| Projection lamp | 24 V, 150 Watts (Halogen type) |
| Exciter lamp | 4 V, 0.75 Amp. |
| Image size | 290 x 210 mm. |
| Mechanical | |
| Film capacity | 600 meters |
| Mounting | Trolley type with castor wheels |
| Dimensions (cms) | |
| With Hood | 122 (L)x109 (D)x126 (H) |
| Without Hood | 122 (L)x98.2 (D)x80 (H) |
| Weight | 180 kg. (Approx) |

The unit requires photodiodes, silicon controlled rectifier transistors, diodes, wire wound and carbon film resistances, trimpots; potentiometers; ceramic, polyster & electrolytic capacitors; hook-up wire and power cables, super enamelled copper wire, mains transformers, puch botton switches, DPST switches, sprockets, gears, rollers, belts, counter, cast aluminium deck plate, M.S. sheets, angles, pipes/plywood board laminated sheets, printed board card, front surface coated mirrors, projection lamp, exciter lamp, condenser and projection lens, 12 faced prism and Amici prism with cemented lenses etc. All these components are indigenously available.

The manufacturer should have facilities for fabrication of electronic subassemblies; mechanical parts viz. gear, sprocket etc; cinematic equipment and optical parts viz. prisms, lenses, front surface coated mirrors etc. All the equipment required for these facilities are available indigenously.

The main instruments required are cathode ray oscilloscope, low distortion audio oscillator, distortion and noise level meter, low and flutter meter, tachometer, SMPTE test films, multimeter. All these items except SMPTE test films, are available indigenously.

The cost of production per unit is about ₨.60,000/-.

# New Machinery and Equipment

## ELECTRONICS AND ELECTRICAL EQUIPMENT

### Alpha and Omega Industrial Analyser

The Alpha and Omega type AO industrial analyser is designed to test alternating current circuits. The analyser may be used on single phase and three phase circuits and is self contained for current ranges of 5, 25 and 125 amperes and 110, 220 and 440 volt circuits. Current and voltage ranges beyond the self contained ranges mentioned can be tested by the use of external instrument transformers. The analyser is in reality a miniature switchboard, complete with Ammeter, Voltmeter, Phase sequence meter, Kilowatt meter, power factor meter, transformers and switches. A three phase ammeter switch is provided to switch the ammeter to any phase of a three phase circuit for checking load balance, and the Voltmeter may be switched across any two lines of a three phase circuit for checking voltage balance. A switch is provided for changing the voltage range of the set to accommodate the circuit being tested. It can be operated only from off-440V-220V-110V & back 110V-220V-440V off. A voltage supply selector switch is also provided. All switches have 'off positions and all switches except the voltage supply selector switch may be operated on the load. The various current ranges are taken care of by taps on the current transformers, these taps are brought out to terminals, it being necessary to change only two loads-on the load side to change the range on 3 (three) phase circuits. The power factor meter being of the polyphase type indicates correctly both on balance and unbalanced three phase circuits. The power factor of single phase circuits may be calculated from the readings of Ammeter, Voltmeter and Wattmeter.

For further details contact sole selling agents: Geekaysindia, Jalaram Nagar, Vallabh Baug Lane, M.G.Road, Ghatkopar (East), Bombay-400077.

### Cable Jointing Kits

M-Seal cable jointing kits enable simple, extremely reliable and economical installation of joints and terminations on underground cables rated upto 33 kv.

The technique of making M-Seal joints is very simple. It does away with bulky cast iron box, lead sleeve, hot poured compound, messy oiled paper, insulation tapes, mixing vessels, thermometers and heating equipment. Instead, the electrical insulation, imperviousness to air, and moisture and mechanical strength to the joints and terminations are provided by simply mixing and pouring of the epoxy resin and hardener into a plastic mould which encloses the joint or termination. An exothermic chemical reaction between the resin and hardener results in a solid compound having excellent electrical and mechanical properties and a very strong adhesion to organic and inorganic materials. No heating of the mixed compound is required. With each kit, a step-by-step instruction sheet is supplied.

The cable jointing compound and hardener supplied with the kit have been judiciously selected to give a low viscosity mixture and a reaction rate which enables void free castings - essential for high voltage cables. The other considerations are high adhesive strength, low exotherm, very low shrinkage, expansion characteristics to match those of the cable parameters, negligible moisture absorption, negligible skin irritation potential of the hardener (resin is harmless) and a special blend and quantum of filler in the cable jointing compound to prevent hard settling of the filler to give a shelf life of three years.

The armour/lead sheath continuity connection supplied with M-Seal kits is extremely simple to install and is designed to safely withstand the thermal effects of short circuit currents.

A wide range of kits is available for making straight through and tee joints and indoor and outdoor terminations for all standard sizes of PILC, PVC, rubber insulated cables rated upto a voltage of 33 kg. and also for multicore control cables, telephone cables and cable for submersible pumps.

Joints and terminations made with M-Seal kit have passed short circuit tests and partial discharge tests at Central Power Research Institute, Bangalore and Bhopal and all other tests as per relevant ISI specifications.

Inquiries to: Mahindra Electro-chemical products, 145, Bombay-Poona Road, Pune-411018.

## Solid State Electronic Sequence Timer

Kamani Electronic, Vadodara has introduced Type KE-201 Electronic Timer. The solid state electronic sequence timer has been designed for applications requiring wide reflux ratios (1:120 or 120:1), upto 3 changeover contacts, any AC/DC working voltages, excellent repeat accuracy, supply voltage drift of 100 ppm, accurate timing and timing range upto 60 seconds.

KE-201 solid state sequence timers provide precise sequence ratios with excellent repeat accuracy. The switching is done by electromagnetic relay of 6 amperes contact rating at 230 VAC or 24 and off at preset intervals. The coarse and fine sequence adjustment knobs have been provided in the front, 10 position step type rotary switch controls coarse period. Potentiometric fine time adjustment facilitates accurate time setting. Timer uses tantalum capacitors that has characteristics of low leakages, high repeat accuracy and high stability with change in temperature. Solid state LED's indicating lamps are used for reflux and offtake indicators. The timers are available in ranges 440V, 415V, 110V, 230V and 24 VAC, 50/60 Hz, 5VA/110V, 48V, 24 VAC 40 mA. Normally the timers are available in compact table top mounting sheet steel cabinets having hammertone paint finish. It can be supplied in panel flush mounting execution if so desired. The size of the unit is 210 x 160 x 80 mm.

Output sockets have been provided at the back of the instrument for connecting electromagnetic to any other load for which reflux ratio is to be controlled. This condition is maintained till the input voltage is removed.

Applications of the timer include packing industries, refineries, chemical, petrochemical, dyestuff, sugar, paper industries and their R&D centres for control of reflux ratios in fractional distillation units.

The new product is being marketed by Arora Enterprises, Vadodara.

## Wire Stripper

A bench-mounted wire-stripping machine for use in the removal of enamel film insulations from round wires that are used in the motor transformer and coil manufacturing industries is available from Eraser.

The model L2 can strip wires between sizes of 3.26 mm and 0.29 mm. Stripping the ends of wires is accomplished by inserting a wire into the front of the unit and withdrawing it. The ends of wires can be stripped upto a length of 63 mm and it is possible to strip wires flush to a component body or coil former. The machine operates from a 230 V, 50 Hz single-phase motor, weigh 4.31 kg. and has dimensions of 200 mm by 150 mm by 200 mm.

Further information from: M/s.R.G. Keswani, P.B.No.16552, Bombay-400018.

## Abrasive Blaster for Finned Cylinders

Intricate castings such as finned cylinders used in automative and motorcycle engines are difficult to be cleaned of debris and slag because of their special shape and configuration. A special abrasive blaster is designed for such castings. It has a blast nozzle, which directs a stream of abrasive at high pressure on to the job. The nozzle has access to inside fins and holes. By thrust of abrasive, the job is cleaned of dirt and debris in seconds. The cleaned surface is then particularly suitable for receiving protective coatings, such as aluminizing, which protects the part against high temperature.

The machine has a work chamber with a special attachment for revolving the part, so that full area is exposed to abrasive stream. Dust produced in the process is continuously extracted by a dust collector. The machine has a control panel for sequence operations and electrical regulations.

For further details please contact: Metallizing Equipment Co., Chopasni Road, Jodhpur, Rajasthan.

## Allcut Metal Band-sawing and Filing Machines

### Features

Driving Wheels & Band: Aluminium alloy wheels are accurately balanced and centered for smooth running. Two wheels for LHS-16 and additional idler in LHS-36 for increased throat. Rubber lining provided for better grip and increased life of wheels and band. Upper wheel tiltable and vertically adjustable in Dove-tail guideways enabling easy mounting. Alignment and tensioning of band, Idler in LHS-36 is also inclinable. Adjustable guard to cover band up to work and auxiliary guard for two wheel operations of LHS-36 ensure operator's safety.

Saw Guides: Bottom guide on trunnion below table. Top guide on adjustable post. Variety of guide blocks to suit duty and application. Resharpenable and adjustable guide inserts set with gauges. Ball bearing backups. Inserts for band widths 1.5 to 20 mm (¼" to 3/4 ").

Drive: Two speed splash lubricated gear box consisting of hardened and ground helical gears with face claws. Infinetely variable speed drive from motor to gear box through compact finger type pulleys of Hylum material. Pulleys are machined all over and well balanced for smooth running. Auxiliary drive from motor to run a rotary air pump. Other auxiliary mechanisms are for speed variation, drive to tachometer and weight type auto feed for LHS-36.

Auto Feed & Work Holding Jaws: (only for LHS-36) Weight type automatic feed control frees operator's both hands to guide work. Continuous adjustment of feeding force with hand wheel No interruption of work in progress. Work holding chain pulled to feed work against band. Foot pedal control for releasing pressure and stopping feed.

Standard Accessories

Band Tension Indicator: Indicates proper tension for various band widths for sawing, filing, polishing etc.

Job selector: For quick selection of i) correct tools for different operations like sawing, filing, etc., ii) Speeds & Feeds for machining various materials.

Speed indicator: Calibrated for linear band speed in two ranges. Auxiliary drive to run tachmeter on opposite side of main drive. Speed variation effected through control hand wheel.

Blade welder: Butt welding unit housed in column. Lever operated cam type shear unit to cut. Blades square for welding, grinding wheel for deburring & cleaning of blades. Also for grinding off welding flashes. Gauge slot to control thickness due to weld build-ups.

Attachments

Disc Cutting Attachment: To cut true circles both inside and outside. Quick setting to any desired radius. Mounted on upper saw guide post. Also for Filing & Polishing.

Rip Fence: Fast and accurate ripping of long members like rods, tubes, channels, rails, Fence guided on bar with fine adjustment. Quick setting and removal.

Polishing: High even finish on job without waste of emery. Bands 50, 80 and 150 grit.

Coolant Drip Applicator: For slow speed sawing. Continuous oil drops on Saw. Better results and life.

Etching pencil: For marking on metallic jobs.

Filing: File guides. File bands with special spring steel backing. Tool-steel file, segments. Operation: 10 times faster than hand filing.

Cut-off and metering fence: for cutting bar stock, tubing and other long parts. Adjustable gauge for quick control of material. Fence guided precisely on rod fitted to table. Can be swung out when not required.

Specifications:

| | LHS-16 | | LHS-36 | |
|---|---|---|---|---|
| | mm | inch | mm | inch |
| Capacities | | | | |
| Throat | 405 | 16 | 915 | 36 |
| Cutting Height | 255 | 10 | 305 | 12 |
| Wheel dia | 405 | 16 | 405 | 16 |
| Table | | | | |
| Size | 610x610 | 24x24 | 660x660 | 26x26 |
| Tilt: Right | 45° | 45° | 45° | 45° |
| Left | 10° | 10° | 10° | 10° |
| Auxiliary Table | - | - | 450x510 | 17x20 |
| Height | 1015 | 40 | 1090 | 43 |
| Band | | | | |
| Speeds | Variable | Variable | Variable | Variable |
| Band speed/min. | 20-90 m<br>275-1500 m | 75-300 ft<br>850-5000 ft | 20-90 m<br>275-1500 m | 75-300 ft<br>850-5000 ft |
| Feed Force (Auto) | -- | -- | 12.34 kg. | 25-75 lbs. |
| Saw band width | 2.5-12 | 3/32-1/2 | 1.5-20 | 1/16-3/4 |
| Saw band length | 3050-3170 | 120-125 | 4320-4450 | 170-175 |
| File band width | 6,10,12 | 1/4,3/8, 1/2 | 6,10,12 | 1/4,3/8, 1/2 |
| File band length | 3125 | 123 | 4550 | 123 or 177 |
| General | | | | |
| Power | 1.5 kW | 2 HP | 2.2 kW | 3 HP |
| Net Weight | 550 kg. | 1200 lbs. | 820 kg | 1800 lbs. |
| Overall Dimns: | | | | |
| Height | 1905 | 75 | 1980 | [illegible] |
| Length | 1090 | 43 | 1865 | [illegible] |
| Width (Doors open) | 1220 | 48 | 1220 | 48 |

For details: Allwyn, The Hyderabad Allwyn Metal Works Ltd., Sanatnagar, Hyderabad-500018.

## Copra Cutter: Hammer Mill

Alfa copra cutters are used to cut the copra into small pieces, before it is sieved in preparation to the breaking mill or to feed the same to oil expeller for crushing. The cutting of copra is done by a number of beaters. The beaters are mounted on shaft supported by two self-aligning ball bearings. The shaft has at one end a flat or V pulley. The cut pieces fall through the perforated mild steel plate sieve. The beaters are case-hardened to the long life.

The copra cutter is fabricated out of mild steel angles and plates and is simple in construction and easy to handle. The working is very simple and beater replacement requires minimum skill.

This can also be used to disintegrate any other material like oil cake, groundnut etc.

Capacity: A bag a minute at 9.00 R.P.M.

Power required: 5 H.P.

Further details from: Alfa Engineering Works, Post Box.1284, Bombay-1.

## Cottonseed Decorticator & Separator

The decorticator has a feed hopper fitted with a revolving feed roll and adjustable feed gate which ensure a positive and regular feed of seed. The cylinder carrying the revolving knives is perfectly balanced and runs in heavy type ball bearings. It is driven at both ends by fixed pulleys, and removable sections in the side frames provide easy access for changing the knives and the removal of the cylinder without dismantling the machine. The concave or breast holds the fixed knives, and its position in relation to the cylinder is adjustable whilst the machine is running, allowing the cutting of the seed to be finely regulated from coarse to fine as required. All risk of the revolving knives striking the fixed knives is eliminated by the provision of safety stops.

The safety studs which hold the concave during the cutting of the seed are designed to break under abnormal strain such as would be caused by the entry of hard foreign substances into the decorticator. If a hard substance enters with the seed, the safety studs break and the concave falls away from the cylinder, allowing the obstruction to fall out. The safety studs are easily replaced at trifling cost and afford the decorticator protection from serious damage.

Another important improvement is the type of knives used. These are interchangeable in both cylinder and concave and are in 12" lengths of equal weight. In the event of one knife being damaged a new one may be inserted without interfering with the other knives or disturbing the balance of the cylinder. The knives do not require individual adjustment and cannot work loose. They are of steel, each providing four cutting edges, so that when one edge becomes worn, the knife is turned to present a new cutting edge, and when all four edges are worn the knive is discarded, its cost being so low that it is not worth regrinding. When ordering decorticators it is advisable to order a spare set of knives with each machine.

Separator - The shaker separator is designed to work in conjunction with the large capacity cotton seed decorticators, the usual arrangement being for the decorticator to be mounted upon the separator. The steel frame of the separator is so designed to obviate vibration when the two machines work together.

The shaking trays work independently and are supported upon brass bushed wood springs. They are driven by eccentrics having large capacity grease reservoirs, and a smooth vibrationless motion is imparted to the trays by spring connected eccentric rods.

A feature of this separator is that the sieves are not made of flat perforated metal but are corrugated and are perforated only in the hollows of the corrugations, the tops of the corrugations being blank. As the thin mat of mixed meats and husk passes down the trays the shaking action causes the meats, which are heavier than the husk, to work through by gravity to the underside of the mat, and so pass through the perforations. The lighter husk and lint floats on the top of the mal and passes over the tops of the corrugations and so is separated from the meats or kernels.

The corrugations perform the important duty of spreading the mat evenly over the sieve so loosening it to allow the escape of the meats, resulting in greater efficiency of separation than is possible with flat sieves. Provision is made for the easy removal of the sieves for cleaning, etc. The driving shaft runs in bearings having large grease reservoirs and is fitted with a heavy flywheel pulley.

Spare knives - The deocrticator knives are 12" long and fit into either cylinder or concave. It is advisable to maintain a stock of spare knives as the same are not intended for re-sharpening.

| Code Word | Approx. capacity per 24 hrs. tons | Driving Pulley |  | Approx. space occupied by Decorticator & Separator | Approx. Weight |  |  |
|---|---|---|---|---|---|---|---|
|  |  | Diam. inches | Brake Horse Power |  | Gross cwts. | Net cwts | Freight tons |
| AEW 1 | 48 | 14 | 14 | 12' 3"x4' 10"x9'high | 54.50 | 42.50 | 9.50 |
| AEW 2 | 72 | 14 | 21 | 12' 3"x6'x9' high | 68.00 | 50.25 | 10.75 |
| AEW 3 | 96 | 14 | 28 | 12' 3"x7' 10"x9' high | 81.00 | 64.00 | 11.90 |

Details from: Alfa Engineering Works, Hassan Chambers, Parsee Bazar Street, Post Box 1284, Bombay-1.

| Type | Capacity of Decorating seed per hour | Speed |  | H.P. required | Weight |
|---|---|---|---|---|---|
|  |  | Beater | Fan |  |  |
| 1. | 1,300 lbs. | 150-170 | 425 | 6 | 540 kgs. |
| 2. | 2,500 lbs. | 150-170 | 425 | 10 | 720 kgs. |

Further details from: Alfa Engineering Works, Post Box 1284, Bombay-1.

## Groundnut Decorticators

This is Hand Decorticator simple machine and its working is easy and trouble free. This is suitable for small units and has the capacity of 800 lbs. of decorticating seed per hour.

This unit employs friction rolling method to break open the shell with minimum breakage of seeds.

The construction is simple, it has a steel frame, adjustable hopper and sieve is of strong section bars to allow adjustments for different size of seeds to fall through.

The main shaft has moving wheel on one side and fly wheel on the other side. The shaft is supported on ball bearings and heavy fly wheel ensures the smooth and free movements. The fan bearings are ordinary or selfoiling. All the parts are made out of selected material and are properly machined to give smooth service.

The machine can also run on power 1½ to 2 H.P.

## Power Decorticator

These are available in two sizes, each unit has strong steel body and is of simple construction. It is easy to handle and has low maintenance cost. The hopper is fitted to the upper part of the frame and seed passes through the opening chamber, where the shell is broken and separated from the kernel. The kernel and the shells fall through the sieves, the slide board, where the fan blower further clean the kernel before they fall out of machine.

The stone separator is provided with power decorticators only.

# Industry Roundup

This section highlights policies and procedures, guidelines, the present status and future prospects in certain industries as well as the latest available data in respect of such industries.

## PUMP INDUSTRY

The progress of the pump industry has been remarkable. Over the years, not only has the production base for pumps been broadened, but the capability to undertake manufacture of special purpose pumps to indigenous designs has also been built-up. As a result, the pump industry can meet almost the entire requirements of various types of pumps both in quantity as well as quality.

Power driven pumps can be broadly classified under two categories:

1. Power driven pumps for irrigation
2. Industrial process pumps

There are at present 53 units registered/licensed with a capacity of 500000 numbers including 14000 numbers of process pumps. Centrifugal pumps upto 4" x 4" dia. is reserved for manufacture in the small industry sector. The production of all categories of pumps achieved by the existing units in the large industry sector during the last 3 years is as follows:

| Year | Numbers |
|---|---|
| 1975-76 | 274415 |
| 1976-77 | 305527 |
| 1977-78 (upto Nov. 77) | 214255 |

The production of process pumps during the last 3 years is as follows:

| Year | Numbers |
|---|---|
| 1975-76 | 4597 |
| 1976-77 | 3788 |
| 1977-78 (upto Nov.77) | 2884 |

There are over 400 units in the small industry sector registered with various states in addition to 53 units registered/licensed with DGTD. The present production of all types of pumps both in the organised, small and medium industry sectors comes to around 700000 numbers per annum.

As regards process pumps, there are 4 units registered/ licensed with DGTD with an installed capacity of 6500 numbers per annum. The production of these units is around 4500 numbers per annum.

The total capital investment to pump industry is estimated at ₨.30 crores and the total employment directly in pump industry is estimated at 20000.

Production of Power Driven Pumps

| Year | Capacity in Numbers | Production in Numbers |
|---|---|---|
| 1975 | 550000 | 287000 |
| 1976 | 362000 | 288000 |
| 1977 | 360000 | 350000 |
| 1977-78 (Actual) | - | 351500 |
| 1978 | 360000 | 366500 |
| 1978-79 | - | 366500 |
| 1979-80 (Forecast) | - | 389000 |

Process pumps for certain special applications are being imported mostly along with complete process plants. The import figures of pumps for the last 3 years are as follows:

Import of Process Pumps

| Year | ₨. in lakhs |
|---|---|
| 1973-74 | 158 |
| 1974-75 | 366 |
| 1975-76 | 350 |

Exports are mainly confined to pumps for irrigation purposes.

Export of Power Driven Pumps

| Year | ₨. in lakhs |
|---|---|
| 1972-73 | 80.57 |
| 1973-74 | 175.08 |
| 1974-75 | 252.62 |
| 1975-76 | 645.65 |
| 1976-77 | 595.35 |
| 1977-78 | 750.00 |
| 1978-79<br>(Estimated) | 850.00 |

Targets of Export of Power Driven Pumps

| Year | ₨. in crores |
|---|---|
| 1978-79 | 8.00 |
| 1979-80 | 12.00 |
| 1980-81<br>(Proposed) | 16.00 |

**Future Scope**

The demand for process pumps required from the fertilizer and chemical industries has been estimated at 14000 numbers by 1978-79. Schemes have already been licensed for the manufacture of process pumps for a capacity little over the estimated demand. The present installed capacity of this sector is around 6500 numbers per annum. It is estimated that capacity likely to materialize out of all the approved schemes including the present installed capacity would be of the order of 12000 numbers in respect of process pumps and high pressure pumps.

Having regard to the capacity available in the large industry sector and the small industry sector, there is no scope for additional capacity for pumps for irrigation. With regard to process pumps some schemes have been approved for the manufacture of process pumps. There is large range of process pumps used in the petro-chemical refineries and other process industries. It is anticipated that the capacity already in operation and the capacity likely to materialize will broadly take care of the demand of process pumps for the Sixth Plan as well. Even then schemes for the production of special types of process pumps not yet manufactured in the country can be considered by way of diversification or new units on merits. Proposals for foreign collaboration for process pumps will be considered on merits.

Details of special purpose pumps developed in the country

Few examples are given here of some of the special purpose pumps developed in the country:

- Centrifugal pumps for chemical industry to handle mercury at 100°C, molten metals, napthalene, ossen, molten sulphur, iron oxide slurry in steel plants, etc.

- Large cooling water pumps, condensate extraction pumps and starting oil pumps for power plants upto 200 MW.

- Special mine drainage pumps for coal mines for heads upto 900 metres.

- Multi-storage and vertical pumps for various process industries.

- Pumps with integrally cast heating jackets, special low carbon (upto 0.03%) stainless steel for handling urea and mechanical seals and auxiliary gland packings.

- Pumps for handling methanol at 70° to 80°C with special methanol quench tank arrangement.

- Rubber-lined pumps for handling nitric acid of various concentrations including red fuming nitric acid.

- Non-clogging pumps with special Ni-hard construction upto BHN 500 for handling different types of slurries in aluminium plants.

- Transformer oil supply pumps.

- Mixed flow pumps with discharge of 7500$m^3$/h and mounted on floating brages for special irrigation schemes.

- Booster pumps in horizontally split casing design in size 200 x 250 mm for boiler feed pumps to handle water at 180°C with special design suitable for taking internal shock because of sudden temperature variation.

(MVS)

*Section IV*

# Current Technical Literature

Copies of articles/documents listed in this section are available on payment of ₨.5/- for the first 5 pages or part thereof and ₨.1/- for every subsequent page of the photo copy or xerox copy of the article/document. While placing the order, please mention the CTL number of the SENDOC Bulletin.

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# CURRENT TECHNICAL LITERATURE

## RESOURCES

### Energy Sources

1. ----: CAZRI develops solar water heater-cum-solar still. Invention Intelligence, 1980, 15(4), 145-146.

   The device basically comprises a double-walled box, the outer wall being made of 20-gauge mild-steel sheet and the inner one of 20-gauge galvanized-iron sheet. The air gap (10 cm) between the walls is filled by glass-wool insulation. The inner box is blackened by black board paint and is provided with a 3 mm thick glass cover at an angle of 20° from the horizontal. The main raw materials required for making solar water heater-cum-solar still are GI and MS sheets, plane glass, glass-wool insulation, etc. all of which are locally available. The cost of production of the device works out to ₨.500 including costs of materials and labour.

2. LAKSHMI NARASIMHAN S: Unified total solar energy conversion plant. Invention Intelligence, 1980, 15(3), 107-115.

   The proposed system is designed to harness free energy sources - solar, wind and rain-for generation of low cost power. It would make for greater decentralisation of power generation while ensuring ecological safety, A technical feasibility report of the total solar energy conversion system has also been prepared.

3. MYLES A S & DAS R K: Built-in solar fabric drier. Invention Intelligence, 1980, 15(4), 157-158.

   Reports development of a solar fabric drier designed to facilitate drying of fabrics in small scale textile printing units.

4. RAMU N: A new type of solar still. Invention Intelligence, 1980, 15(5), 202-204.

   Constructed entirely of locally available materials, the new solar still is claimed to be more economical than electrical distilling plants. Construction details, materials required, operation and performance of the solar still are discussed. (JBS)

5. SONWALKAR N: Economical systems for solar energy utilisation. Invention Intelligence, 1980, 15(6), 244-247.

   Describes three solar energy systems-a solar house system, a solar electricity generator, and a modified solar pump - which could be designed and built with indigenous skill and materials. (AA)

6. ----: Export potentiality for spices. Industrial Researcher, 1980, 7(2), 113-117.

   Examines trends in the imports of spices in major world markets and stresses the need to concentrate on new markets. (JBS)

7. ----: The sugar industry in India - A review. Industrial Researcher, 1980, 7(2), 125-130.

   Sugar accounts for only about one third of the total sugarcane available in India, a fact which suggests that any solution to the problem of the industry should centre around the use of sugarcane in products other than sugar. One such solution would be to promote industries based on molasses, a by-product of the sugar industry. A suggestion is made for the development of alcohol and alcohol-based industries.

8. PILLAIYARI P et al: Hot air stabiliser for rice bran. The Journal of the Oil Technologists Association of India, 1978, 10(4), 151-153.

   A low cost hot air stabiliser of 150 kg. capacity was developed and standardised.

9. RATHI R J: Potentials of sugarcane. Indian Chemical Journal, 1980, 14(10), 23-26.

   Discusses the potential of alcohol which is the main sugarcane based raw material for the chemical industry. (BS)

10. REVATHI: Chemical industry today and tomorrow. Cashew nut shell liquid industry: A survey. The Chemical Times, 1979, 6(27), 3.

## PAPER, PULP AND ITS PRODUCTS

11. ----: Buyers' Guide for the paper industry. Pulp and Paper International, 1980, 22(1), 67-113.

    A comprehensive listing of the main companies that make the machinery, equipment and chemicals for the worldwide pulp and paper industry, as well as the main firms supplying consulting and technical services.

12. ----: Newsprint from bagasse. New experiments on maximising pulp. Paperprintpack India, 1980, 18(2), 32-34, 49.

    Experiments on making newsprint from bagasse have proved successful during the last decade. The quantum of bagasse pulp available in the world made sweeping rise and it is expected that by the end of the year, two million tonnes of bagasse pulp will be available.

13. ----: Product profile: Mini paper plant. The Chemical & Polymer Times, 1980, 9(90), 5.

Steps involved in the process, raw materials, machinery & equipment and capital investment required for the manufacture of paper in minipaper plant are given. (MSR)

14. ----: Problems of paper industry. Perfectpac, 1980, 20(7), 9-12.

15. ----: Straw boards. DIC Guntur Newsletter, 1980, (9), 9-11.

Gives details of a scheme for the manufacture of 1500 tons of boards per annum from the paddy straw available in Andhra Pradesh districts the investment on machinery and equipment being approximately ₨.3 lakhs. (JBS)

16. BASSEMIR R W: Ink technology for coated paper developments for the 1980's. TAPPI, 1980, 63(1), 61-63.

The effects on printing-ink technology of environmental regulations, energy shortages, and raw materials costs and availability are discussed. Those ink systems most likely to predominate in the 1980's are evaluated with respect to these factors. A discussion of various ink-drying mechanisms and their effect on the printing requirements of coated papers is included.

17. BELL R: The pressure-sensitive label, its function, opportunities, and limitations. Package Engineering, 1980, 25(7), 57-59.

Discusses the opportunities and limitations associated with the P-S label and the high speed label application machinery without which the label is useless.

18. BOLAJI S B: Paper from tropical (Nigerian) hardwoods. Chemical Age of India, 1980, 31(3), 247-250.

19. COOPER J D: Paper industry in the 1980s. Paperprintpack India, 1979, 17(12), 41-44.

Examines technological change, growth in employment position in paper industry and price trends in 1980s.

20. NAGAVI B G & MITHAL B M: Microcrystalline cellulose (MCC) from newsprint waste. Indian Journal of Pharmaceutical Science, 1979, 41(6), 224-226.

MCC has been prepared from waste newsprint and compared with MCC marketed by Acme Laboratories.

21. SAIKIA C N et al: Micro-encapsulation and carbonless copy paper. Indian Pulp & Paper, 1980, 34(5), 21-29.

A rapidly expanding speciality paper product is the chemical transfer type of carbonless copy paper. This type of copying paper depends on the release and reaction of chemicals on one or two surfaces of paper under pressure of handwriting, typewriter, or keys of an electronic printer etc. The carbonless copy papers are designed to eliminate the carbon interleavers used in multipart forms. Micro-encapsulation of dyes for use in carbonless copy paper and recent developments in the technology of carbonless copy paper making are discussed. (AA)

22. SAIKIA CN & CHALIHA BP: Copying and duplicating papers. Paintindia, 1980, 30(6), 11-15.

23. SANYAL A: Quality container bags-future challenges. Perfectpac, 1980, 20(4), 17-19.

Reviews the aspects of quality control of container bags and highlights the challenges of eighties and manufacturers' obligations. (BS)

## CHEMICAL INDUSTRIES

24. ----: Statistical profile for industrial gases. Industrial Researcher, 1980, 7(2), 142-143.

Installed capacity, production and indigenous manufacturers of oxygen gas and dissolved acetylene gas are presented in tables.

25. ----: Sulphuric acid - A demand analysis. Industrial Researcher, 1980, 7(2), 93-95.

At present there are 81 units with a total licensed capacity of 32.63 lakh tonnes per annum and an additional capacity of 20.5 lakh tonnes has already been sanctioned. The demand for sulphuric acid is estimated at 42.3 lakh tonnes by 1982-83. By that year, assuming that the industry operates at 70% capacity, the supply will be around 28 lakh tonnes. Thus there is good scope for existing units to expand their capacity and for establishment of new merchant units. (JBS)

26. KOTHARY N C: Better project management - An overview. Chemical Engineering World, 1980, 15(5), 25-30.

The tools and techniques used in project management are becoming increasingly sophisticated in line with the importance of their applications in integrated multiproject schemes. An overview of some of the aspects of project management, the methods and tools utilised and their practical implications are presented. (AA)

27. PAL M & GARG R K: Modern trends in solvent extraction research - part 2. Developments in equipment technology. Chemical Engineering World, 1980, 15(5), 63-70.

28. REVATHI: Chemical Industry today and tomorrow. Analysis of IDBI's role. The Chemical Times, 1979, 6(48), 3.

Reviews the growth of chemical industry and gives IDBI's assistance to chemical industry under project finance scheme (1978-79) (BS).

29. REVATHI: Chemical industry today and tomorrow. Selection of chemical plants; Some tips. The Chemical Times, 1979, 6(46), 3.

Highlights the aspects of choosing the end product, selecting the best chemical process, determining the optimum plant size, financing the venture and government regulations to be followed. (BS)

30. SANT B R: Scope for the development of inorganic chemical industries. Indian Chemical Manufacturer, 1980, 18(4).

Enumerates the R&D investigations in the division of inorganic chemicals of RRL, Bhubaneswar to develop suitable technology for the production of inorganic chemicals. The raw materials considered are industrial waste/by-products, ore, minerals, marine resources and synthetic preparations. (BS)

31. SOMASUNDARAM N & JACOB K: Slack wax from petroleum. Chemicals and Petrochemicals Journal, 1979, 10(4), 9-12.

Slack wax is soft paraffin wax resulting from incomplete pressing of the settlings from petroleum distillate. The manufacturing process and the uses are described. (KSDR)

32. SUBRAHMANYAN K V: Sulphuric acid and cement from fertilizer plant waste. Chemical Weekly, 1980, 26(1), 71, 72.

Flow sheet of the Kruppa-Chemie Linz process for the manufacture of sulphuric acid & cement, its advantages & disadvantages and raw materials required are outlined. (MSR)

## DRUGS AND PHARMACEUTICALS

33. ----: A non-technical note on the production of pangamic acid. (Vitamin $B_{15}$). IDMA Bulletin, 1980, 11(8), 85.

Deals briefly with the feasibility of production of pangamic acid on a commercial scale. (BS)

34. GUDSOORKAR V R: Vehicles for direct compression. Indian Drugs and Pharmaceuticals Industry, 1980, 15(2), 16-19.

There has been a trend towards the use of direct compression in tableting. It is a means to reducing tableting costs; producing smaller, more attractive tablets with faster drug release; and eventually to complete automation of the tableting process. Discusses different vehicles used in direct compression. (AA)

35. REVATHI: Chemical industry today and tomorrow. Drugs and Pharmaceuticals: A review. The Chemical Times, 1979, 6(22), 3.

Reviews the status of the drugs industry giving statistics of production, imports and letters of intent and licenses issued. (BS)

## SURFACE COATINGS

36. ----: Recent developments in nickel electroplating. Colour and Chemicals Weekly, 1980, 6(17), 41-43.

New methods in nickel electroplating are mentioned, one important method being electroles nickel plating which is a technique for obtaining a coherent adherent nickel coating. (CV)

37. WAKE S J: Plating-plant and process review. Sheet Metal Industries, 1979, 56(10), 916-919, 920.

Reviews significant changes which have occured over the past few years in plant and processes for the electrodeposition of base metals for decorative and corrosion resistant purposes, on components fabricated from sheet metal. A comprehensive list of plating and colouring processes is provided together with a final comment on rinsing and effluent treatment.

## LEATHER INDUSTRY

38. ----: Glove leather manufacture-trends. Leather Markets, 1980, 10(1), 33-34.

39. ARYA O P: Good prospects for leather exports. Journal of the Indian Leather Technologists' Association, 1979, 27(12) 9-11.

Reviews the export performance during 1977-78 and 1978-79 and examines the prospects in future. (BS)

40. CHELLAPPA S: An estimation of the production and consumption of leather footwear in India. Leather Processing, 1979, 3(4), 21-22.

Estimates the production figures as well as domestic consumption of leather footwear based on the total availability of raw materials as well as export of various types of leather which go in footwear production. (BS)

41. MURALIDHARA H S & MAGGIN B: Recovery of energy and chrome from leather waste. The Leather Manufacturer, 1979, 97(9), 30-35.

Presents a pyrolysis method for handling leather tanning wastes to recover energy and chromium compounds for use in the tanning process. Energy and cost savings are estimated.

42. NAYUDAMMA Y: The evolution of tanning in India, Pakistan and the People's Republic of China. Leathers, 1980, 21(1), 3-9.

Gives a comparative note of leather and footwear industry of India, Pakistan and China in all aspects, giving statistics of production, consumption, demand etc. (BS)

43. ROSS R T & THORNTON R L: Microorganism control in the tannery. The Leather Manufacturer, 1979, 97(7), 22-29.

Discusses briefly the micro-organisms that are involved, their attraction to skins and hides, and the principles involved in assuring a good micro-organisms control programme in the tannery. (BS)

44. SREENIVASAN P C: Problems that beset the Indian tanning industry. Leather Markets, 1980, 9(6), 29-33.

Reviews the price situation and the problems encountered due to the same. (BS)

45. WASAN K N: Leather shoe uppers. Leather Markets, 1980, 9(6), 15.

Reviews the past export performance and examines future scope. (BS)

## MECHANICAL ENGINEERING

46. ----: Export potentiality for commercial vehicles. Industrial Researcher, 1980, 7(2), 81-91.

Analyses the potentiality of exports of commercial vehicles by studying production trend, the installed and licensed capacity of commercial vehicles manufacturers, destination of imports, composition of exports and a case study of some of the selected countries. Benefits that an exporter gets in terms of cash compensatory support and duty drawback have also been discussed in detail.

47. BANERJEE J K: Role of industrial engineering in ancillary development. Industrial Engineering Journal, 1980, 9(4), 19-24.

Discusses two points, viz. economic growth, and full employment in the area of ancillary development and tries to highlight the ways in which industrial engineering could be used.

48. BASU S K: Technological development in the Indian machine tools industry. Invention Intelligence, 1980, 15(4), 148-154.

Reviews the present status of the Indian machine tools industry and identifies the technological gaps vis-a-vis the acquisition and assimilation of new technology aimed at building up economic self-reliance.

49. DAVIEW I: Recent electric furnace developments for non-ferrous foundries. Foundry Trade Journal, 1980, 148 (3183), 45-48; 51-55.

Discusses the use of resistance furnaces and gives detailed cost breakdown compared with fuel-fired units, and indicates the relative efficiencies of the different types. Examines the advantages which the coreless induction furnace offers to aluminium and copper-rich alloy founder; compares other types of electric melting units, specifically reverberatory furnaces, channel induction furnaces and low-energy furnaces.

50. GAUR M C: Spiral bevelgear cutting machine. Invention Intelligence, 1980, 16(6), 250-253.

Suitable for small scale production, the machine employs format cutting for pinion and gear. The cost of the indigenous machine for cutting spiral bevel-gears, is only about ₨.43,000 which is very much less than the cost of an imported machine (₨.12 lakhs) or even the earlier development of a heavy-duty lathe attachment (₨.4.20 lakhs including cost of heavy-duty lathe). The comparative production cost of a spiral bevel-gear works out to ₨.3,000 by the new machine, ₨.5,000 by the heavy duty lathe/attachment and ₨.16,000 by the imported machine.

51. MARSHALL G: Electrical safety in the foundry. Foundry Trade Journal, 1979, 146(3165), 1427-1428.

Indicates some of the hazards which can arise in the foundry as a result of bypassing safety interlocks, the rigging of temporary electrical distribution systems, and from inefficient lighting. Suggestions are given as to the steps the foundry electrician can take to avoid accidents and how the engineering safety office can fulfill a useful role.

52. MULLA D S: The Indian machine tools industry-a review. Bombay Market, 1980, 43(8), 79-84.

Gives rate of growth of machine tools industry, prerequisites for future growth, direction for future growth and export prospects. (KLR)

53. ROY P K & BANHELE S I: Machining wavy grooves and ribs on conventional centre lathe. Invention Intelligence, 1980, 15(6), 248-249.

A simple, improvised method and modification on conventional centre lathe makes it easier to cut wavy grooves and ribs on a number of jobs, according to specification and with a high degree of accuracy and precision. (AA)

54. SURENDER KUMAR & BENERJEE A C: Some concept of tool design system to aid productivity. Machine Building Industry, 1980, 19(2), 25-30.

Describes the concepts of tool design system, interaction model and hydro-analogy model which will be helpful in analysing, understanding and designing the optimum tool design system that will be helpful in increasing industrial productivity. (KLR).

## PRINTING

55. ----: Printing of carpets by vapour phase. Colourage, 1980, 27(15), 43-49.

Describes the technique of carpet printing using sublimal dyes, giving some examples as case studies. Purpose of using a sublimal dye is to change the dye to a vapour phase to make easier the diffusion of the dye into the fibre. (CV)

56. ----: The U.K. printing industry. Perfectpac, 1980, 20(7), 13-14.

57. NARKAR A K: Heat transfer printing of cellulosic fabrics. Textile Dyer & Printer, 1980, 13(7), 33-39.

Enumerates the developments in heat transfer printing of different fibres and describes the processes of HTP of different types of cellulosic fabrics. (BS)

58. RANADE K S: Heat transfer printing in India. The Indian TextilesJournal, 1979, 90(3), 37, 39, 41, 43, 45, 49, 50, 53, 55, 57, 58.

In this exhaustive survey of the status of heat transfer printing technology in India today, the basic principles of heat transfer printing are explained and its present status in India in development of technology and components for heat transfer printing with local know-how and materials is discussed.

59. REED K J: Screen printing, Polymers Paint Colour Journal, 1980, 170(4021), 262-264, 266.

Highlights the printing machines, printing screen and ink specifications.

60. REED K J: Screen printing: part 2. Polymers Paint Colour Journal, 1980, 170(4022), 289-292.

Outlines the categories of the screen printed products, their specific substracts, and different chemical types of screen inks. (KSDR)

61. SLOT S W: Recent advances in printing technology. The Indian Textile Journal, 1979, 90(3), 65-69.

The author sketches the developments in printing technology made during the last four years by stock-Brabant BV. of Boxmeer, Holland, one of the leading manufacturers of textile printing equipment in the World.

ELECTRICAL INDUSTRIES

62. GOODYEAR B: Tool transformers. Electrical Equipment, 1979, 18(3), 49-53.

The importance of tool transformers, their role in safety, precaution in electrical equipment and their characteristics are described.

63. KERTSCHER E et al: A new process for the manufacture of magnet wire. Wire Industry, 1979, 46(550), 725-729.

Describes a completely new process for manufacturing enamel insulated magnet wire (so-called enamelled wire). Unlike the generally applied technique of using solvent enamels with subsequent solvent evaporation and hardening of the enamel film using a baking oven, the new process uses a modified and developed form of extrusion process which has been employed for years in the manufacture of cables and wires.

The process and its basic problems are described in detail using the example of a 4 wire system for conductor diameters of 0.4 to 1.2 mm. Material selection is also discussed. In this regard, suitable and economical materials were found from which extruded enamelled wire was produced. The results of tests carried out on that wire as well as first operational trials in relay coils and IEC standard motors are described.

64. MATOUSEK H: New system for the manufacture of wire and cable. Electrical India, 1980, 20(10), 27-33, 35-36.

In the wire processing industry, continuous efforts are are being made to achieve higher productivity, better product quality, to reduce material waste and improve working conditions for the operating personnel. These are foremost objectives in a material cost intensive industry. The availability of large rod and wire coils, properly packaged, has been an important contribution in achieving these objectives.

## ELECTRONICS INDUSTRIES

65. ----: Electronic road traffic signal controller made by ITI. Electronics Review, 1979, 7(12), 8.

Briefly describes the electronic road traffic signal controller, (ITICON-78) its main features, its system description, construction etc.

66. ATKINSON A: Resistor networks materials and performance. Electronic Engineering 1979, 51(631), 129, 131, 133-135, 137.

Gives the latest developments in the design, materials technology, and manufacturing equipment used in the production of thick film resistor. (AA)

67. GANATRA PH: Magnetic tapes and cassette industry; problems. Electronics Today, 1979, 12(2), 29-32.

Discusses how the magnetic tapes can be manufactured from the dustfree plant. (BSR)

# SENDOC Services

Featured in this section are technical enquiries that were received and the services rendered by SENDOC during the month of December 1980. The charges for short technical enquiries will be Rs.5.00 to Rs.10.00 per typed page. Industry profiles already available with SENDOC are charged at the rate of Rs.10.00 each.

| S.No. | Enquirer | Service Rendered |
|---|---|---|
| 1. | Con.-Bihar | Profile on:Jute stick powder.<br>Technical note on:Sulphuric acid |
| 2. | Con.-Uttar Pradesh | Profiles on:Prestressed concrete poles/pipes, concrete spun pipes. |
| 3. | Ent.-Andhra Pradesh | Profiles on:Black insulating tapes, Paper cones, Laminated jute bags, Barium chemicals, ferric alum, Paper envelopes, Automobile components, Spectacle frames, Metallic tubes, Gun metal bushes, Nonferrous die-casting, Stainless steel utensils, Printed wax paper, Paints, Safety matches. |
| 4. | Ent.-Madhya Pradesh | Profiles on:Iron powder, Crown corks. |
| 5. | Ent.-Maharashtra | Profile on: Tamarind seed starch, Bakelite electrical accessories, Exercise books, Straw board, Wire nails, Welding electrodes. |
| 6. | Ent.-Tamil Nadu | Profile on:Absorbent cotton. |
| 7. | Ent.-West Bengal | Profile on:Mini cement plant. |
| 8. | FI - Maharashtra | Profile on:Jute bags, Bleaching powder, Maize starch. |
| 9. | Andhra Pradesh | Profiles on:Cement, Mosaic tiles, Calcium Carbonate, Bolts and nuts, Printing inks, Carbon papers, Welded wire mesh. |
| 10. | SI-Bihar | Profile on:Tin containers |
| 11. | SI-Delhi | Profile on: Hand tools |
| 12. | SI-Kerala | Profile on:Gelatin capsules, Pilfer-proof caps, PVC pipes Distilled water. |

| S.No. | Enquirer | Service Rendered |
|---|---|---|
| 13. | SI-Maharashtra | Profiles on:Zinc oxide, Paper cones, Aluminium rerolling mill, Plastic textile bobbins, Refractory bricks.<br>Technical note on:Fire extinguishers |

Note:- Con. - Consultancy Organisation, Ent. - Entrepreneur,
FI. - Financial Institution, SI. - Small Industry.

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# New Products and Processes

## CHEMICAL INDUSTRIES

### Continuous Counter-current Ion-exchange Water Softening Unit

The Central Salt & Marine Chemicals Research Institute (CSMCRI) Bhavnagar, has designed and developed an economical water softening unit based on the technique of continuous counter-current ion-exchange. Providing as it does, a continuous supply of soft water, the process is more economical than the lime soda process and the conventional fixed bed ion-exchange process both of which are most widely used on a commercial scale.

When the hardness of raw water is high and the soft water requirement is large, lime soda process is uneconomical as it involves higher fixed capital on land and higher operating cost, and needs skilled workers. Further, perfectly zero hardness water is not obtained.

The conventional fixed bed ion-exchange water softening technique is a discontinuous process involving a stagewise operation, exhaustion, regeneration and rinsing. In such a technique, as the hardness of raw water and the service flow rate desired increase, the resin investment becomes prohibitively high and at the same time the equipment size, the floor space required, the regenerant consumption and the rinse water requirement also increase in corresponding proportion. The advantages of the water softening apparatus designed and fabricated by CSMCRI are that: (i) it gives a continuous flow of treated water; (ii) resin investment and consequently the regenerant and rinse water consumption are low; and (iii) equipment size and the floor space required are small, thereby achieving a substantial reduction in initial investment on the water softening plants and the cost of the treated water.

A typical assembly of continuous counter-current ion-exchange water softening plant consists of a single column whose upper, middle and bottom portions act as loading zone, regeneration zone and rinsing zone for the ion-exchange resin respectively. In each zone, the resin and the appropriate solution move in opposite direction. The resin which travels down through various zones is lifted from the bottom and fed at the top of the exhaustion zone. Soft water leaves the assembly from an outlet at the top.

The plant does not need any complicated valves, timers, relays etc. A simple air control device aids the resin transfer. No valve opens or closes during the operation, thus avoiding attrition of the resin. All the components are available indigenously. Except for the compressor and pump, there is no part in the entire design which is likely to become unserviceable and cause breakdown. Easy to assemble and simple to operate, the plant can be managed easily even by an unskilled worker and requires minimum attention.

A successful demonstration of the working of continuous counter-current ion-exchange water softening plant was held recently at Botad railway station (Western Railway). The railways might save a substantial amount of soda ash, currently in short supply, by adopting this technique at various places. The technique has a definite edge over all other water softening methods when the soft water requirement is very high and the raw water in very hard.

## Nitrile Rubbers

Nitrile rubbers (NBR) are special purpose synthetic rubbers which find varied applications in oil, gasolene and solvent hoses, oilseals, O-rings, gaskets, adhesives etc. The major raw materials, acrylonitrile and butadiene, are manufactured in India. The National Chemical Laboratory (NCL), Pune, has developed technology for the manufacture of three major grades of NBR (which account for more than 80% of NBRs used in India). The process has been licensed to Synthetics and Chemicals Ltd. Bombay. Following pilot plant and consumer acceptability studies, the firm commissioned, in 1977, a commercial plant with a capacity of 2000 tonnes per annum of NBR. The cumulative production of NBRs based on NCL know-how from 1974 to March 1979 was 1276 tonnes valued at Rs 245.59 lakh.

In the NCL process, acrylonitrile and butadiene are emulsion copolymerized at 5°C in the presence of an emulsifier, electrolytes, chain-length regulator, catalysts, etc. At predetermined optimum conversions, the polymerization reaction is annihilated by the addition of suitable short-stops. Ageing resistors are added and the solid rubber is obtained by regulated addition of brine and acid. The rubber is washed free of undesirable materials and dried.

Polymerizations and copolymerizations of butadiene when carried out to high conversions, result in premature crosslinking of the rubbers which consequently have inferior physical properties and processing characteristics. The conversions are therefore optimized to achieve the highest permissible conversions consistent with good processibility product, keeping the recovery and recycle of the unreacted monomers to the minimum. Polymerization at the low temperature, which leads to superior processing properties in the rubbers, is achieved by the use of suitable redox initiators. The reducing agent incorporated in the redox recipe is kept to the minimum by incorporating auxiliary reducing agents. This results in rubbers with superior storage stability as the concentration of the multivalent metallic ions in the rubber which have adverse effects on the storage stability of the rubber is greatly reduced. The emulsion polymerization is a heterophase reaction. Polymerization proceeds in discrete monomer-swollen polymer particles, the supply of the monomer being maintained by their diffusion through the water medium. The difference in reactivities of the two monomers results in a composition drift during the polymerization. In the NCL process, incremental addition of the faster consumed monomer is practised to achieve greater composition homogeneity. The emulsion stability is of critical importance to prevent the fouling of the reactor, but it should not cause additional problems at the coagulation stage. Synergistic combination of stabilizers is incorporated in the rubber to achieve better storage stability.

Synthetic rubbers are manufactured to stringent specifications regarding their processibility characteristics and physical properties. Minor variations in ultimate conversions, chemical composition, short-stop efficiency, coagulation and drying etc., severally and individually, result in drastic variations in the processing characteristics of the rubbers. The special features of the NCL process are linear reaction rates and thus better process control, greater composition homogeneity andimproved storage stability. The process was standardized in a laboratory pilot-plant yielding about 7 kg. of rubber per batch.

Synthetics and Chemicals Ltd., collaborated in market survey, and evaluation of the laboratory produced rubbers. Some of the aspects of technology such as recovery and recycle of the unreacted monomers and effluent disposal were exclusively worked out by the firm.

## Zinc Phosphate Pigment

The Central Electrochemical Research Institute (CECRI), Karaikudi, has developed a process for the production of zinc phosphate pigment which can be used for preparing anticorrosive primers for ferrous metals.

Although the use of zinc phosphate as an anticorrosive pigment has been well established in the West, it is not widely used in India. Zinc phosphate reduces the diffusion rate of corrosive ions through paint film and slowly phosphates the metal surfaces. Zinc phosphate in primers promotes excellent intercoat adhesion, particularly under conditions of high humidity. It is nontoxic.

The CECRI process (Indian Pat. 146164) consists in preparing a slurry of zinc oxide or zinc carbonate with water and adding it to a stoichiometric quantity of suitably diluted orthophosphoric acid. Constant stirring is maintained during the addition. Zinc phosphate formed is filtered and washed in a centrifuge. The product conforms to the specification BS: 5193. The process has been studied on a laboratory scale (10 kg batches).

The primer prepared from the zinc phosphate has been evaluated electrochemically in accelerated and field tests and its performance has been found to be satisfactory.

Zinc oxide/zinc carbonate and orthophosphoric acid are the main raw materials, and these are available indigenously. All the equipment for manufacturing the pigment are available in the country.

The minimum capacity of an economically viable unit suggested by CECRI is 300 tonnes of product per annum.

The total investment for putting up such a plant has been estimated at about ₨ 19.05 lakh, comprising a fixed capital on equipment, including erection charges, of about ₨ 4.51 lakh and a working capital (for 90 days) of about ₨ 14.54 lakh. The cost of production is estimated at ₨ 18.50/kg.

## ELECTRONICS AND ELECTRICAL INDUSTRIES

### Electronic Probe Measures Pasture Yield

A research team at the Pastoral Research Laboratory of the CSIRO Division of Animal Production, Armidale, N.S.W. has developed a cheap, light-weight probe for measuring pasture yield.

The probe responds accurately to differences in surface area of herbage which correlates well with yield. It should prove useful in applications such as experiments to test the effectiveness of different fertilizer or pasture treatments, and in productivity trials with different pasture grasses.

Though looking rather like a space-age gun, the probe is simple to use. The operator pushes the end of its 76 cm long and 2.5 cm diameter barrel into the pasture until it touches the soil underneath. A reading is taken when he presses the trigger.

The instrument's electronic system records on digital counters both the number of readings taken and the sum of the readings since the last reset. The operator obtains figures for yield of dry matter in kg. per hectare, by referring the instrument's readings to a calibration chart.

The instrument works by detecting changes in electrical capacitance at the sensing end of the probe. An aluminium tube inside theprobe forms oneplate of a capacitor, and the surrounding herbage the other. Since the area of the aluminium plate is constant, any changes in capacitance must be due to changes in the area of the foliage. Such changes are converted by the instrument's integrated circuit oscillator to a signal that is registered by the electronic counter.

The Division has tested four prototypes in grazing trials with phalaris-white clover pasture. The scientists found that the performance was particularly good considering the wide range in botanical composition and green herbage content of the pastures.

The Division believes the instrument could be constructed for less than $ 100 in an electronics workshop, and hence may appeal to developing countries conducting field research projects.

The possibility of producing a more complex version is being looked at by the Division. The scientists think it might prove useful in tasks including pasture and forage budgeting, evaluation of fertilizer test strips, and various experiments in pasture management. This version would incorporate a microprocessor to enable the mean yield of herbage and variability within each plot to be recorded automatically.

The Division is keen to hear from manufacturers interested in commercial production of the probe.

For more information: CSIRO Division of Animal Production,
Pastoral Research Laboratory, Private Mail Bag, Armidale,
N.S.W. 2350, Australia.

## External Demand Pacemaker

Pacemaker is used for direct heart stimulation in cases of intermittent or complete heart block. Two types of pacemakers. viz., external and internal, are generally used. The external pacemaker stimulates the heart from outside the body, while theinternal pacemaker does so from inside the body. The internal ones are mainly used where long-term pacemaking is desired.

The Central Scientific Instruments Organisation (CSIO) Chandigarh, has developed an external type pacemaker, which is a ventricular synchronized demand type pace. A series of electrical impulses of constant current is available from the instrument, which can be used for pacemaking needs. The rate and amplitude of these impulses are adjustable. The instrument is useful for short-term pacing of a patient during pre-

The device provides stimulation in the demand mode only when an R-wave is not detected within the period corresponding to the set rate. Sensitivity to R-wave signal is adjustable. Care has been taken to avoid the possibility of heart stimulation during the vulnerable period of cardiac cycle. Competition between the stimuli of synchronized origin and the external stimuli of the pacemaker cannot occur. A meter is provided to indicate whether thepulses are from the heart or the pacemaker.

Compact and operational on a 9 V battery, the device can be easily worn by the patient on the belt provided. No special electrodes are needed for synchronization.

The laboratory has made two prototypes and three fully engineered units. Clinical trials have been successfully conducted at the Postgraduate Institute of Medical Education & Research, Chandigarh.

The specifications of the device are as follows:

| | | |
|---|---|---|
| Mode | : | continuous and demand |
| Pulse rate | : | adjustable from 50 to 150 pulses/min; accuracy ± 5% |
| Pulse amplitude | : | adjustable from 0.1-20 mA. constant current on loads upto 700 Ω: accuracy ± 10%. |
| Pulse duration | : | 2 ms ± 10% |
| Sensitivity to detected R-wave | : | 2 mV min. signal |
| Meter indications | : | right deflecting pulses (pulses from pacemaker to heart); left deflecting pulses (detection of R-waves from heart) |
| Catheter electrode used | : | bipolar-endocardial (intravenous) |

As the device is an assembly-oriented product, general-purpose mechanical equipment like hacksaw, bending machines, press, soldering iron and other hand tools are sufficient for mechanical fabrication. For testing, equipment like oscilloscope, signal generator, power supplies, multimeters, ECG simulator, dB attenuator, etc. are needed. All are available indigenously.

Transistors, diodes, capacitors, resistors, electrodes, switches, cabinet etc., are the components. For the manufacture of 500 units of these pacemakers, a fixed capital (excluding land and building) of ₨ 0.50 lakh and a working capital of ₨ 1.25 lakh are needed.

The terms for transfer of know-how are as follows: lump sum premium, ₨ 5000; recurring royalty, 3% nature of licence, non-exclusive; and period of licence, 5 years.

## Instrument for Controlling Furnace Temperature

A new instrument devised at the CSIRO Division of Mineral Chemistry maintains the temperature of medium-sized electric furnaces and heating baths to within 1°C to 1000°C.

The compact bench unit controls heating over the range 50°C to 1500°C. It has two features that make it ideal for working with furnaces in laboratories or other situations where sensitive electronic equipment is in operation nearby.

The first is that it doesn't generate interference through the mains power supply. The other is that it enables the amount of power going into the heating element to be limited.

Normally, the power load required to heat up a furnace is sufficient to cause mains interference that may show up, for example, as spikes on the chart of a sensitive recorder.

The CSIRO unit uses a 'zero crossing' circuit to prevent interference. This controls the number of cycles out of the 50-cycle mains supply being applied to the furnace each second. The remainder of the available cycles are blocked. The instrument also prevents interference that can occur when an operator adjusts the dial to alter the amount of power to be supplied.

The unit is calibrated to sense the temperature of the furnace in terms of the electrical output from a standard thermocouple element made of platinum /platinum-rhodium or chromium/aluminium. The operator reads the thermocouple output in millivolts. It is normal practice to have a temperature-voltage chart handily placed should he wish to convert the meter reading into degrees.

The unit also incorporates a power limit facility that prevents excessive dissipation of power at low temperatures in the platinum or crucelite element of the furnace. The application of too much power when a furnace is cold can result in fuses being blown.

The power limit meter is on the right. The operator adjusts the dial underneath to set a power ceiling as the furnace is being heated. When it has reached the required temperature, he can read off the power level needed to maintain this temperature and adjust the dial accordingly.

The instrument prevents power run-away in the event of a break in the thermocouple by stopping the power supply if this happens. Transformers that reduce the voltage from 240 to 30 v may be coupled to the instrument without causing any loss in performance.

A device that allows on-off switching and the rate of change of heating to be programmed can be plugged into the instrument. An operator can set this so that the furnace works according to plan in his absence.

The Division has produced 20 prototypes for use in CSIRO laboratories and for industry trials. It would like to hear from firms interested in the commercial manufacture of the instrument. A selling price of around $ 400 is envisaged.

For more information: CSIRO Division of Mineral Chemistry, PO Box 124, Port Melbourne, Vic. 3207, Australia.

## VHF Multichannel Electronic Tuner

The Central Electronics Engineering Research Institute (CEERI), Pilani, has developed the design of electronic tuners for TV receivers.

The electronic tuner usually consists of three parts, viz. RF amplifier, local osillator and mixer. The signal received by the antenna is brought down to the input of the tuner. A filter to select band I or band III is provided to minimize the interference. The selected signal is amplified by the RF amplifier where the in-band channel selection is achieved by the varactor diodes used as the tuning elements. Switching diodes are used to select the required band. The amplified signal is mixed with local oscillator whose frequency is also changed with the help of the varactor diodes and switching diodes. The mixed output is available at the standard intermediate frequency suitable for CCIR standard 'B'.

Ten units of this tuner were made by the institute and subjected to detailed tests and long-duration field trials. Their performance has been found to be good.

The specifications of the electronic tuner developed are as follows:

Supply voltage : 12 V (regulated) nominal

Gain : Band I - 30 dB (min.)
Band III - 20 dB (min.)

Noise figure : Band I - 6.0 dB (max.)
Band III - 6.5 dB (max.)

Interference (IF rejection) : Band I - 40 dB (max.)
Band III - 6.5 dB (max.)

Image rejection
VSWR : Band I - 50 dB (Min.)

Without AGC : Band I - 3.5
Band III - 4.0

With AGC : Band I - 4.0
Band III - 4.0

The raw materials and components required are: transistors, varactors, switching diodes, VHF trimmers, feed through capacitors, coils, IF transformer and glass/copper-clad laminates. The raw materials for thetuner box will have to be procured by the party contracted for this purpose.

Of the equipment required, oscilloscopes, multimeters, power supplies, and VHF signal generator are indigenously available but VHF sweep generators, VHF defectors and noise figure meter will have to be imported.

For manufacturing 5000 units of these tuners per annum, a fixed capital (exclusing land and building) of ₨ 1.75 lakh and a working capital of ₨ 2.00 lakh would be needed.

The terms for the transfer of know-how are: lump sum premium ₨ 5,000; recurring royalty, 3%; nature of licence, non-exclusive; and period of licence, 7 years.

## FOOD AND ALLIED INDUSTRIES

### Fractionation of Red Chillies

CFTRI has developed a process for physical Fractionation of red chillies into their components: seeds, pericarp and pericarp rich in dessepiment (inner sheath). It is the dessepiment which contains a high concentration of capsaicin, the chemical compound responsible for the pungency of chillies.

Separation of the parts of chilli by this process has made it possible to produce three products from chillies; namely, oil from the seed amounting to 19 per cent of the seed weight; a natural red colour virtually free from capsaicin, from the pericarp; and colourless oleoresin, containing 20-25 per cent of capsaicin, from the dessepiment. There is good demand for such highly pungent oleoresin in foreign markets.

In contrast, the oleoresin extracted from whole chillies, according to customary practices, has very low pungency as it contains only about 3 per cent capsaicin; it has, moreover, a deep red colour which diminishes the value of the product.

Production of natural red colour from chillies assumes significance in view of the proposed ban on use of synthetic colours in the country from April 1981.

The process of chilli fractionation has been demonstrated on a pilot-plant scale, and sizeable quantities of capsaicin-rich pericarp and seeds have been supplied to interested parties.

Entrepreneurs interested in the commercial exploitation of the process may approach the National Research Development Corporation of India, New Delhi.

## Post-harvest Technology and Processing of Grapes

CFTRI scientists have developed know-how for various postharvest operations such as storage and transportation of fresh grapes for marketing, and processing of grapes into useful finished products that can ensure better economic returns. Maximum benefits can only accrue if the marketing of the produce is on organised lines.

Among measures to be taken to minimise losses in the marketing channel are: harvesting of grapes at optimum maturity, pre-harvest spraying of grapes with fungicidal-growth regulator solution, proper storage condition, in-package sulphur dioxide fumigation, and use of suitable packages.

To get good results, care should be taken to ensure that the grape bunches are uniform in size and free from diseased berries. Largesized bunches with over-ripe berries are not desirable for transportation and storage. Regular prophylactic treatments in the vineyard during grape cultivation ensure healthy and sound bunches suitable for long distance journey. For transportation of grapes to distant markets, improved containers such as bamboo basket, deal-wood case, and plywood crate, designed by the institute would be very useful.

The different varieties of grapes grown in Karnataka such as Anab-e-Shahi, Thomson seedless and Bangalore blue can be normally stored for 6-8 weeks by maintaining temperature at 32-34°F and relative humidity of 85-90 per cent. Storage beyond this period is uneconomical. The storage life would be better if the grapes are kept in cold storage within 24 hrs. after harvest.

The know-how for production of important products from grapes like juice, raisins and wine and brandy has been worked out by the institute. In addition, canning, frozen storage and preparation of jams are also possible.

Grape juice can be prepared on a small scale by pulping, heating and basket pressing with a normal yield of about 50-65 per cent juice. The yield could be improved to 70-80 per cent and a clarified product obtained by using pectolytic enzyme, for which know-how can be provided by the institute. Procedures have been worked out for preparing raisins based on studies carried out by the institute on sun-drying and mechanical drying of grapes grown in several ation parts of India. A demonstration of the process could be arranged by the Institute on payment of a fee of ₨ 1,000/- to cover the expenses.

CFTRI studies have shown that Bangalore blue, Bangalore purple, Beauty seedless and Gulabi are suitable varieties for making red wine of satisfactory quality. Anab-e-Shahi and Selection-7 give a bland wine but can be used for low alcoholic beverages. Bangalore blue which was previously considered unsuitable for wine production, has been proved to be a good material for making a satisfactory red wine; the process know-how for this is being offered by the Institute.

## MINERAL BASED INDUSTRIES

### Ferrocement Folded Plate Roofing Element

Ferrocement, a new structural material consisting of rich cement mortar reinforced with steel wire mesh, has high resistance to cracking and can be cast into structurally efficient forms like doubly-curved shells and folded plates, with as small a thickness as 15 mm. It is therefore highly suitable for prefabricated shell and folded plate units for tanks, roofs, etc. Practically no equipment or machinery is needed for casting ferrocement elements. Roofs made of ferrocement elements are fully impermeable to water and have a much longer life compared with low-cost roofing made of other materials.

The Structural Engineering Research Centre (SERC), Roorkee, has developed a folded plate roofing element in the form of a trough for a clear span of 3 m. The units are 60 cm wide and can be kept side by side with an overlapping water-tight joint. The reinforcement consists of 4 mm diam GI wires in the longitudinal and transverse directions and two layers of chicken mesh. The cement mortar has a minimum cube strength of 300 $kg/cm^2$.

Each unit weighs about 120 kg and can be lifted by four persons and erected on a brick wall. The cost of the roof consisting of such units is expected to be about ₨ 80 per square metre of covered area. The units can be cast at site, with minimum of trained labour.

## Fuel Economy Through Slurry Thinners in Cement Manufacture

Conservation of energy-both thermal and electrical-has assumed great importance all over the world and allout efforts are taking place to achieve both fuel economy and electrical energy conservation in various industries. In cement industry, the energy cost alone accounts for over 50 per cent of the cost of cement manufacture, out of which the thermal energy consumption - which is in the form of fuel consumption - is of the order of 30 percent. As this element of cost is the biggest in thecost of cement manufacture, constant efforts are being made to achieve economy in fuel consumption in cement manufacture.

In the wet process manufacture of portland cement, the calcareous and argillaceous raw materials are wet ground, homogenised and transported as a slurry through the plant pipework and storage capacities and fed to rotary kilns where it is burnt with coal to convert it into clinker. To achieve high fuel economy, large kiln throughput and full use of storage capacities, low moisture and high solids content within the slurry are desirable. However, low moisture and high solids content lead to increase in viscosity of the slurry which causes plugging of the mills and pipelines and heavy pumping, milling costs etc. The normal moisture level in the slurries in Indian cement plants is generally kept around 33-39 percent.

It has been found that the lower is the water content, the lower is theheat consumption and vice versa. It has been estimated that each percent of water reduction in wet slurry increases the kiln capacity by about 1.5 percent; simultaneously, the heat requirement of clinker burning drops by about 1 percent.

The adjustment of viscosity and solids content in wet raw-meal slurries by thinning or deflocculation has been practised in the cement industry abroad for almost four decades. Slurry thinning means reduction of viscosity by the chemical agents or more properly maintaining a given level of viscosity at an increased solids content. Slurry thinners are compounds which when added in small quantities to a viscous slurry reduce the viscosity of the slurry considerably. Slurry thinners are specific in action in relation to raw materials, nature and surface properties and the latter determine the dosage of the thinners. In other words, the choice of a slurry thinner should be based on the specificity of the acting grouping, its physicochemical interaction and rheological properties and economy. Potential slurry thinners may be classified into three broad categories as under:

i) Simple inorganic alkali compounds such as sodium carbonate, sodium hydroxide, sodium silicate etc.

ii) Inorganic polyelectrolytes such as sodium tripolyphosphates, sodium hexametaphosphate, sodium pyrophosphate, etc.

iii) Organic polyelectrolytes and surface active agents such as lignin derivatives, humic acids, sulphate/sulphite liquor, calcium lignin sulphonates, molasses, etc.

Cement Research Institute of India (CRI) has identified and investigated a variety of indigenous slurry thinners for their possible application in wet process cement plants. These include inorganic electrolytes namely sodium silicate, sodium carbonate, sodium sulphite, sodium orthophosphate, sodium hexametaphosphate and tetrasodium pyrophosphate, by-products from wood pulping process namely sulphate lye or sulphite lye (commonly known as black liquor), Celex (a commercially marketed form of sulphite lye) and Sallogen (a commercially marketed slurry thinner imported from abroad).

A number of wet slurry samples from different cement plants situated in various parts of the country representing the general characteristics of Indian raw materials for cement manufacture were collected and employed in the studies on moisture reduction for fuel economy.

The slurry thinners were evaluated for their performance in moisture reduction by monitoring the rheological changes of the slurries. Two sets of experiments were done, namely:

i) Determination of viscosity of slurries with increasing concentration of the slurry thinner keeping the solid/water ratio constant, and

ii) Determination of viscosity of slurries containing an optimum percentage of the reagent at varying solid/water ratio.

The optimum concentration of the slurry thinner was taken as that amount of the reagent beyond which the effect of further increase in concentration of the reagent did not significantly change the viscosity. The laboratory results have revealed that all the slurry thinners studied have resulted in marked reduction in moisture content for the same flow. The conclusions are as under:

i) Addition of phosphates and other inorganic electrolytes in small dosages (0.06 to 0.3 percent) resulted in moisture reduction in the range 2.5 to 4.5 percent depending on the nature of the slurry and the slurry thinner.

ii) Addition of 0.08 to 0.3 percent of any of the organic surface active industrial by-products resulted in a moisture reduction of about 2.8 to 6.6 percent depending on the dosage and also on the nature of the slurry and the slurry thinner.

iii) Though all the slurry thinners studied were found to be effective in moisture reduction, the economics in most cases did not permit their use in cement plants in India. It is only the industrial wastes/by-products such as black liquor (sulphate lye or sulphite lye) and Celex which are both technically and economically suitable for use as slurry thinners on regular basis.

Based on the laboratory findings, CRI has conducted five industrial plant trials by employing theimported product Sallogen and the indigenously available sulphate/sulphite lye (black liquor) and Celex. These industrial plant trials have established that the industrial by-products namely sulphate/sulphite lye (black liquor) and Celex are as efficient if not more, as the imported and expensive slurry thinners. The plant trials further indicated that the slurry thinners can be profitably used in almost all wet process plants in India. The benefits obtained during these industrial plant trials are:

a) Significant saving in the grinding costs (saving up to 4 kWh/tonne of raw meal),

b) Saving in fuel consumption (2 to 5 percent), and

c) Increase in kiln output (5 to 10 percent) without affecting the quality of the clinker.

The cost of the slurry thinner being not more than a rupee per kg. the net savings are substantial, and can be in the range of ₨ 1-2 per tonne of clinker produced.

Based on theplant trials carried out and the technology provided by CRI, some of the wet process cement plants have already started employing the CRI slurry thinners in their regular production and the feedback received from these plants has indicated that they are getting a saving in heat requirement of about 60 kcal/kg of clinker on a sustained basis which works out to nearly 4 percent saving in fuel consumption. Also a significant increase in production has been obtained without affecting either the quality of the clinker/cement or any other parameter.

The slurry thinner is available in the market under the trade name of 'Celex'. Alternatively, arrangement for regular supply of the black liquor can also be made with any nearby paper plant. The black liquor generally contains 10-15 percent solids of which about 50 percent is organic material and the rest inorganic. The organic portion is made up of 10-15 percent wood sugars, 40-50 percent lignin derivatives and about 20 percent tannin matter. Many paper factories subject the black liquor to certain processes in order to burn the organic matter, which is surface active and responsible for the slurry thinning action, to get the heat value and to recover theinorganic salts for recycling. Having realised the benefits cement industry can derive from the black liquor, some paper plants have already now started supplying part of their black liquor to some cement plants on a regular basis.

CRI extends any assistance to such cement plants who wish to make use of this important technology of slurry thinners for saving in fuel consumption in cement manufacture and has already assisted a few plants who are now adopting the slurry thinners in their regular production.

## Precalcinator Technology

Cement Research Institute of India started work on the development of an indigenous precalcinator appropriate to Indian cement industry in 1974.

The need for investigations and development of a precalcinator arose mainly from two considerations. Firstly, the precalcining systems developed elsewhere in the world use oil for both the primary and secondary firing. Although some systems like MFC, FLS and Polysius tried coal, it was only for secondary firing. Further the quality of coal used in the trial runs was much better than the coals used in Indian cement plants. Secondly, not a single system has so far been developed where coal, or even high grade coal has been used for both primary and secondary firing.

Since Indian cement plants mainly use coal as the fuel, the need for developing a precalcinator appropriate to the Indian cement industry was thus more than justified. As a first step, the different precalcinator systems developed elsewhere were examined critically. In the second stage, laboratory experiments were carried out to establish certain design parameters for different systems. Finally the design for CRI precalcinator was evolved on the basis of simplicity in fabrication, flexibility in achieving the desired degree of calcination, ease of operation and above all the investment cost.

CRI precalcinator is a simple system in which the meal is calcined further in the extended 4th stage duct of the suspension preheater. It comprises a combustion chamber and a calcinator duct arranged in series. Secondary fuel and the meal from the 3rd stage of the preheater are fed into the combustion chamber in such a manner that the meal is entrained in the swirling mass of combustion air and fuel and get thoroughly blended with the fuel. The air for combustion of the secondary fuel (precalcinator fuel) comprises partly the air drawn through the kiln and partly the ambient air fed with the fuel.

The dimensions of the precalcinator depend on the nature and type of fuel as well as the time required for attaining the desired degree of calcination of the meal. Any type and grade of coal can be used and desired degree of calcination attained.

The precalcinator put up by CRI at Mysore Cements, Ltd., Ammasandra in September 1979 has been designed for an increase in output of 30 percent with pulverised coal as the fuel. The combustion chamber is of cyclonic type to the extent that the fuel and part of the combustion air at ambient temperature are fed into it tangentially. The swirling motion produced under such conditions ensures mixing of the meal and fuel, and creates near isothermal burning conditions.

The instrumentation scheme for the precalcinator is simple and effective. The fuel feed rate is controlled by the temperature of the gas at the discharge end of the calcining duct. The raw meal feed rate is controlled through a weighfeeder by the differential temperature of gases at kiln inlet and the 1st stage cyclone exit. An $O_2$ analyser at the kiln inlet is used to monitor the oxygen content. An $O_2$ and CO analyser located at the entry to the 4th stage cyclone i.e., the end of the precalcining duct, monitors the $O_2$ content and gives a signal whenever the CO content exceeds the set limit.

## Operating Experience

i) There is no significant change in the exit gas temperature although systems abroad have reported an increase of 15 to 20°C.

ii) With 2 to 2.5 percent $O_2$ in the gas at entry to 4th stage cyclone, the CO content is between 0.1 and 0.15 percent.

iii) There is improvement in clinker litre weight.

iv) With about 15 percent fuel fired into the precalcinator the degree of calcination achieved has been, on the average, about 60 percent.

v) The fuel consumption of the system remains practically the same.

vi) The coating problems experienced by the kiln earlier have practically disappeared after the installation of the precalcinator.

vii) Power consumption is practically unchanged.

viii) The output of the kiln is increased by 30 percent.

ix) The life of the refractory lining has already increased to 3 times the normal life.

The precalcinator systems so far developed are applicable to dry suspension preheater kilns. In India today there are about 30 dry SP kiln units with capacities ranging from 300 to 1200 tpd. On a conservative estimate it should be possible to increase the total capacity of these units by about 30 percent through installation of precalcinators thus raising the production from these units by about 1.5 million tonnes.

About 12 new dry SP kiln units having a total installed capacity of 3.7 million tonnes per annum are either already commissioned or are likely to be installed/commissioned in the near future. Further it is reported that some of these units have provision for incorporating precalcinator at a later stage through surplus capacities in the other unit operation equipment. It is, therefore, reasonable to assume that the production of these new units can be raised on an average by about 40 percent, i.e., by 1.5 million tonne annually, by installing precalcinators.

While all known precalcinator systems are reported to be capable of giving upto 95 percent calcination of the meal at kiln inlet, there could be some constraints in adopting such designs in the existing plants owing to the limited capacities of the suspension preheater and clinker cooler, on the one hand, and the other unit operational equipment like the raw and finish grinding mills, on the other. As indicated already, it may be possible to increase the capacities of these units generally by 30 to 40 percent and stretched to even 50 to 60 percent in some favourable cases. But whatever be the feasibility, the ultimate economies depend on the precalcinator system chosen. In this respect the CRI precalcinator system has an edge over others because of its simple design and lower investment cost. Therefore, it would be logical to expect that for the same increase in production in any given unit, CRI precalcinator could prove to be more economical.

For further enquiries write to: Cement Research Institute of India, M-10 South Extension II Ring Road, New Delhi-110049.

# New Machinery and Equipment

## ELECTRONICS AND ELECTRICAL EQUIPMENT

### Data Logger

An intelligent, microprocessor-controlled data logger combining ease of operation with maximum versatility in a single unit has been launched by Philips. Upto 950 channels can be controlled by one unit.

Results can be conditioned into the relevant engineering units using internal linearisation tables and formatted for internal or external presentation. All information in the data logger is protected from mains failure by a standby battery. Thermocouple break warning and self-test before start up are also standard.

No technical knowledge is required to operate the PH 4000. Programming is reduced to a simple question-and-answer dialogue using a built-in keyboard and internal alphanumeric display. No special programming language is necessary. Safety measures like error indications on the display in case of false programming ensure proper logic functioning.

Step-by-step operation tells the machine user exactly how to programme and in what order information should be entered. Once a programme is complete, it can be dumped out onto an industrial magnetic tape cassette for future use. So the same programme can be used time and time again.

An integral printer provides datalogging output. In addition, output is possible through serial, FACIT or IEC bus interfaces for video display teletype, paper tape and computer use. Output can be measured data, the whole programme or even the complete memory content in any chosen format.

The system will find wide applications in industry and elsewhere when a simple but efficient form of data logging is required. Typical uses include process monitoring on start up. Here the logging and alarm system allow any problem points to be picked up, allowing rectifying for subsequent use.

Further information from S & I Department, Philips India Ltd.
Shivasagar Estate, Block 'A', Dr. Annie Besant Road, Worli,
Bombay-400 018.

## Solid State Electronic Sequence Timer

KE-201 Solid state sequence timers provide precise sequence ratios with excellent repeat accuracy. The switching is done by electromagnetic relay of 6 Amps contact rating at 230 VAC or 24 VDC. The relay contacts go on and off at preset intervals. The coarse and fine sequence adjustment knobs have been provided in the front. 10 position step type rotary switch controls coarse period. Potentiometric fine time adjustment facilitates accurate time setting. Timer uses tantalum capacitors that has characteristics of low leakage, high repeat accuracy and high stability with change in temperature. Solid state LED's indicating lamps are used for reflux and offtake indicators. The timers are available in wide ranges. Normally, the timers are available in compact table top mounting sheet steel cabinets having hammertone paint finish. It can be supplied in panel flush mounting execution if so desired, The size of the unit is 210 x 160 x 80 mm.

Output sockets have been provided at the back of the instrument for connecting electromagnetic/any other load for which reflux ratio is to be controlled. This condition is maintained till the input voltage is removed.

The timer is suitable for switching 5 Amps, 230 VAC/0.5 Amps 220 VDC resistive loads and inductive loads upto 1200 VA rating. The timer can be used in conjunction with contactor/relays to switch higher rated load. Facility for complete off take can be provided on request.

Ranges:

Input: 440 V, 415 V, 230 V, 110 V & 24 VAC, 50/60 HZ, 5 VA/ 110 V, 24 VDC, 40 mA. Anyone range standard. More than one range optional.

| | | | |
|---|---|---|---|
| Performance: | Repeat Accuracy | ± | 2% |
| | Calibration Accuracy | ± | 2% |
| | Mechanical life expectancy of electromagnetic relay | = | 1 million operations on load |

Applications: Packing industries/refineries/chemical/petrochemical/dyestuff/sugar/paper industries and their R & D centres for control of reflux ratios in fractional distillation units etc.

Manufactured by: Kamani Electronics
Vadodara 390 002.

Marketed by: Arora Enterprises
Gayatri Krupa
20, Abhar Society
Nizamaput
Vadodara 390 002

### Temperature Indicator

The digital temperature indicator types 56 and 57 have been designed to meet international standards of performance. Using proper sensors such as platinum resistance or thermocouples, the instrument can measure temperatures from minus 200 degrees C to 1650 degrees C with accuracy of the order of 0.1 per cent to one per cent. A special digital linearisation technique is incorporated to eliminate errors due to drift, instability and aging of components, which gives high accuracy over a long period of time.

Automatic ambient temperature connection is incorporated to take care of any variation in the ambient temperature. The instrument employs the latest technology and use of LSI CMOS chips. Readout is in bright red LED type display system which is considered as one of the most reliable readouts with trouble-free operation for a long time.

The instrument will be useful for industries where the precision measurement of temperatures are desired. For further information please contact M/s. Arun Electronics Pvt. Ltd., B/125-126, Ansa Industrial Estate, S.V. Road, Sakinaka, Bombay 400 072.

## ENGINEERING EQUIPMENT

### Die-Ripping Machine

An ultrasonic die-ripping machine, developed by a British firm for the wire drawing market, can make accurate reduction and exit angles in tungsten carbide dies in an average cycle time of 3 min. The Disonic machine, which considerably reduces the maintenance and servicing of dies, eliminates the use of loose abrasive powder and steel needles with their constant need for regrinding.

Compact and easily transportable, it is in two parts - a ripping assembly with a rising turn table and a separate mains-driven generator control unit.

A special feature is the combination of vibrational and rotational movement with a diamond-plated ripping nib oscillating ultrasonically in liquid at high speed to remove material from the tungsten carbide dies. The nib oscillates vertically at a frequency of 18/20 kHz and rotates at about 5,000 rev/min. while the die is rotated in the opposite direction at approximately 50 rev/min.

A range of interchangeable diamond-plated nibs makes it possible to rip any required reduction or exit angle between 8° an 90°. The machine can handle tungsten carbide dies with bores from 0.5 m to 10.5 m.

Paraffin oil is fed at a carefully controlled rate between the nib and the die to assist the ripping action and control of the debris. The paraffin acts as the essential energy carrier and coolant during the abrading operations. It is metered to the zone in minute quantities and then allowed to drain away into the drainage system with the fine particles of abraded stock.

The worktable is controlled by an adjustable air valve enabling the required cutting pressure between the die and the diamond-plated nib to be precisely maintained.

The generator unit contains the power supply, the variable timer with a range of 0-300 seconds, and the ultrasonic oscillator unit. If excessive current is taken from the power supply, a trip switch operates within milliseconds to cut off power from the generator.

Dimensions of the Disonic die ripper head base assembly are: 360 mm x 310 mm x 610 mm, weight 45 kg, and of the generator unit: 310 mm x 320 mm x 190 mm, weight 11 kg.

The firm can supply a complete die-shop package, besides the tungsten carbide die ripper. There is a specially designed die polisher to simplify lapping and polishing operations, and a system of cleaning dies ultrasonically after servicing which is used through intermediate lapping and before and after final polishing with the firm's diamond compound.

Manufacturers: Engis Ltd., Park Wood Trading Estate, Maidstone, Kent, England.

Agent: Bhukhanvala & Sons, P.O.Box 169, Meadows House, Meadows Street, Fort, Bombay.

## High-Power Milling Machine

A high-power, moving-column milling and boring machine, developed by a British company to handle large, heavy and unwieldy workpieces, offers maximum effective milling dimensions of 1.65 m x 840 mm x 10.3 m. Extra large workpieces can be partly floor-mounted if required. The Elgamill Hi-power CS may also be used as a conventional milling machine, operating economically on much smaller components.

The fixed-bed, travelling-column equipment incorporates an 18.5 KW (25 hp) or 22.5 KW (30 hp) ram-type milling head; particularly robust bed, saddle and column castings; large section slide-ways; X-axis drive by rack and pinion; independent high-performance d.c. motor drive to the Y-and Z-axes through recirculating ball lead screws; heavy-duty slideway covers; hydraulic balance to the head slide; and outboard support for the column.

These features permit the machine to accept numerical control equipment, which is optionally available, without further modification. A digital read-out can also be provided. Standard machines are pendant-controlled.

Manufacturers: Butler Machine Tool Co. Ltd., Mile Thorn, Halifax, Yorkshire, England.

Agent: ABMTM Ltd., 21, Camac Street, Calcutta.

### Non-contact Seal

A non-contact seal designed to protect rotating equipment and especially its bearings from contaminants such as water, cutting fluids, steam and dust, has been developed by RHP Bearings.. Designated inproseal, it is a two-part seal, usually made of metal, which works dynamically to expel contaminant. It has no rubbing contact with the rotating shaft like traditional lip seals. The protected equipment will therefore last longer, maintenance costs will be reduced and down-time is avoided, it is claimed.

Typical applications are on pumps, drying rolls, gearboxes, motors, steam turbines and other rotating machinery, and a complete engineering service is being offered by the company who aim to provide custom built seals to solve many contaminant and sealing problems.

Inquiries to: RHP Aerospace Bearings Division, Stone House, Glos, GL10, 3 RH, U.K.

### Scale-cum-Stand

TI Cycle of India has designed a scale-cum-stand for liquified petroleum gas cylinders. Priced about Rs 75, it consists of a three-arm top plate mounted and resting on similar boss of a base also of three-arms. On one of the clamps is fixed a dial plate with an indicator moving along an ablong slot in the plate flanked on either side by calibrated graduations.

As the weight of the cylinder decreases due to consumption of the gas in it, the indicator point is moved towards zero alerting the consumer of the proximity to thepoint of shutdown of gas supply.

### Thermal Wire Stripping Machine

A bench-mounted thermal wire stripper, suitable for stripping all types of thermoplastic insulations from wires with outer diameters between 0.20 mm and 6.00 mm, is available from

Eraser. The Rush A 5C has been designed for continuous production use and more than one wire can be stripped at a time. Production rates in excess of 1,000/h are possible and the machine incorporates a length stop to ensure consistent strip lengths.

The temperature at the heating elements of insulation is said to be important to produce a clean consistent strip. There is claimed to be no danger of nicking, denting, or damaging the conductors of the wires being stripped. The use of spring loaded heating elements avoid the need for adjustment to suit wire size. The unit measures 146 mm by 127 mm by 305 mm and weighs 4.1 kg. It operates from a 230 V, 50 Hz single phase supply.

Further information from: M/s. R.G. Keswani, P.B. No. 16552, Bombay 400 018.

## METALLURGICAL EQUIPMENT

### Beam Welding

A portable vacuum electron beam (EB) welding machine has been developed at the Bhabha Atomic Research Centre. The machine is useful for circular welding which is required in the fabrication of boilers and similar pressure vessels. The electron beam used is a small diameter, high density heat source.

The advantages of EB welding over conventional welding units are: it welds dissimilar metals and those with high melting points. Narrow, deep penetrating welds (without edge preparation) can be produced in a single pass, and the welds have depth-to-width ratios of 8 to 10 or even higher.

The machine is designed for welding tubes of diameters in the range of 110 mm to 150 mm to tube sheets and nozzles of similar diameters on the shells. The machine can be converted with suitable modifications in the mechanical system to a local vacuum machine for carrying out longtitudinal welds.

### Seam Welding

Seam welder developed by Jaya Hind Sciaky can be supplied in 75,100, 150, 200 KVA ratings and throat depths upto 1400 mm suitable for the drums/barrels to be welded. The special features include: (i) encapsulated welding transformer, (2) solid state HINIL IC control, (3) infinitely variable DC drive and (4) silver bearings for electrode assemblies. Production rate is approximately 100 drums per hour.

The Rocker arm type 17 KVA spot welder is a standard unit used for the pre-tacking of the pre-formed drum shell. From the pre-tacking operation, the drum shell is passed to a standard longitudinal seam welder fitted with a drum support along the lower arm.

Circumferential seam welder for welding the top and bottom lids is also available.

For further details, please write to Jaya Hind Sciaky Ltd., D1 Block, Plot No. 18/1, Chinchwad, Pune 19.

## Ultrasonic Welding: Plastics Assembly

Latest addition to the range of thermoplastic assembly system available from Dawe Instruments Ltd., is the Series 7010 ultrasonic welding machine. This machine uses a technique which is claimed to have transformed industries engaged in the assembly of thermoplastic components. A jig holds the components is position while a specially shaped precision metal horn applies high frequency vibrations. The areas to be welded vibrate against each other, producing localised frictional heating which melts the plastic in the immediate vicinity of the joint. Applied pressure causes the molten plastic to flow throughout the joint area. When the vibrations cease, the plastic solidifies to produce a strong uniform joint. The system is said to be reliably fast, and it can readily be automated.

The series 7010 can be used for welding plastic to plastic, staking metal or other material to plastic and inserting metal into plastic. Machines with output power ratings of 450 W., 900 W and 1,400 W are available. Designed for safety, ease of use and maintenance, and based on a single casting, they are said to be rigid and precise in operation. Working rates of upto 1,200 assemblies per hour are claimed. Industries, already using ultrasonic plastic assembly systems include electrical and electronic, trade moulding, textile, packaging, automotive, toys and games, and household and hardware goods.

Inquiries to: Dawe Instruments Ltd., Concord Road, Weston Avenue, London W 3OSD, U.K.

# Industry Roundup

This section highlights policies and procedures, guidelines, the present status and future prospects in certain industries as well as the latest available data in respect of such industries.

## UMBRELLA INDUSTRY

### Introduction

The most important development in the modernisation of umbrella design was brought about in 1852, when a Britisher, Samuel Fox, patented his design of paragon steel frame-the now familiar U-shaped frame with metal ribs. Towards the end of last century, foldable umbrellas with steel ribs and fancy handles were developed.

At present, umbrella manufacture has become a part of the consumer goods industry. In addition to the conventional black cloth umbrella, there is a growing demand for special umbrellas used by golfers, anglers, surveyors and beach umbrellas. Umbrella manufacturers are also meeting the demands made by ever changing fashions by making umbrellas of silk, rayon, nylon and cotton in a wide range of designs and colours.

### Umbrellas for different groups and purposes

Umbrellas are generally classified as, gentlemen's,ladies, babies, agriculturists, garden and beach, golf and special umbrellas for marriages and other social or religious ceremonies. They are also grouped as black cloth umbrellas and multi-coloured nylon or cotton cloth umbrellas.

### Variety

More than 100 different varieties are now available. While bulk of the production comprises conventional varieties, in recent times, the demand for coloured and fancy umbrellas has been growing. In fact, these now account for 21 percent of the production. Among the sophisticated varieties available are those with sandal wood handles and foldable and self opening ones. There have also been some innovations in the styling. Dome-shaped and source umbrellas have also been marketed. A wider range of colours are also available.

## Beginning of the Industry

During the British rule umbrellas were always imported from the UK and other European countries. Although the first factory to manufacture umbrellas was set up in the 19th century, it had to depend on imports for umbrella cloth and ribs. There were other stray attempts to manufacture umbrellas locally, but none of these were quite successful due to the difficulty in getting necessary raw materials and machinery. After World War I, a few units were set up in the small scale sector around Calcutta, which assembled umbrellas from imported components and sulphur-dyed cloth. These units fought tooth and nail for survival against tough foreign competition.

The Indian umbrella industry made a real beginning only after World War II, when the government banned the import of umbrellas. Many small umbrella manufacturing units sprang up in all parts of the country. The manufacture of umbrella cloth was undertaken by the Century Spinning & Manufacturing Co., Ltd., Bombay and that of umbrella ribs by 4 units around Calcutta. But, the umbrella ribs manufacturing units closed down within a few years of their inception due to shortage of raw material and technical knowledge. Consequently, the industry was once again forced to depend on imported components.

## Expansion

Manufacturing of umbrellas in an organised way was undertaken only after the First Plan period. The closed units around Calcutta reopened their line of production. One unit in the large scale sector was set up at Bombay to produce umbrella ribs. Production of umbrella cloth was undertaken by a few more textile mills. Production at the beginning of the Second Plan (1956) was estimated to be over 6 million, and that of ribs was about 550,000 sets. Production of umbrella cloth in 1957 was 7.74 million metres.

Production of umbrellas, ribs and cloth at the end of Second Plan (1961) were 2.62 million, 12.93 million sets and 7.96 million metres respectively. The total number of units engaged in the production of these items were 51,11 and 28 respectively.

During the Third Five Year Plan (1961/62-1965/66) the number of units engaged in the manufacture of umbrella ribs in the large scale sector came down to 6. Consequently, the production of ribs also decreased to 6.24 million sets at the end of the plan. The production of umbrella cloth also came down to about 5 million metres.

## Present Position

There are about 500 big and small units engaged in the manufacture of umbrellas. These units are scattered throughout the country, but the industry is mainly concentrated in big urban centres like, Bombay, Calcutta, Delhi, Ahmedabad and Madras. It is estimated that about 10 million umbrellas are annually produced in the country.

Cotton cloth for umbrella is being manufactured by 5 units in the large scale sector, of which the Century Spinning and Mfg. Co. Ltd., Bombay, is the largest producer of black cloth. It is estimated that in 80 per cent of the umbrellas produced in India one or other of the 17 types of umbrella cloth furnished out by the Century is used.

Manufacture of umbrella is mainly seasonal occupation in India, and as such, many units remain idle or work at much below to their rated capacities for the major part of the year. Therefore, unlike other industries, no definite targets could be fixed for the production of umbrellas and their fittings

## Problems

Due to the late outbreak and the erratic behaviour of the monsoon, sales of umbrellas were poor. And the manufacturers sometime left with large stocks of unsold umbrellas.

The progress of the umbrella industry has been hamstrung by a lot of problems. These include insufficient availability of raw materials as well as inflationary pressures. For instance, there is only one major producer of special umbrella cloth namely the Century Mills. None of the cloth manufactured by mills other than century are satisfactory. A lot of processed cloth is passed off as special umbrella cloth and some unscrupulous mills even stamp the Century label to improve their credibility.

The raw materials available are only suitable for the manufacture of conventional varieties. Materials for the manufacture of superior quality umbrellas like special nylon cloth and special ribs for foldable umbrellas are in short supply. While this does not come in the way of units catering to the domestic demand, it is a major constraint on increasing exports.

## Raw materials

Wood, steel, plastics, cotton and nylon are the basic material for making components of an umbrella. Wood is the traditional material for making stems and handles of umbrellas. However, steel tubes are gradually replacing wooden stems.

For the production of wooden umbrella, banboo is extensively used. Different bamboo species, such as, Pseudostachyum polymorphum, Dendrocalamus strictus, Oxylenanthera monostigma, Arundinaria jaunsarensis and A.falconeri are found suitable for this purpose.

Sometimes, the carved or worked handles, which are separately made, are attached to the stem of the umbrella while in other cases one end of the wood or bamboo stem is bent into a crook under steam or heat to form the handle. The main species of wood used for this purpose are: Indian Olive, ebony, Indian Dak, and certain deciduous wood species like Cotoneaster spp., Prunus puddum and Staphy lea emodi. All these species are widely distributed throughout the country.

Steel, in the form of rod and wire, is used for making tubes and ribs and various other small parts of an umbrella. High Carbon steel is required for making umbrella stems and ribs. Plastics are mainly used for making umbrella handles and ferrules. Cotton and nylon are required for producing umbrella cloth.

## Manufacture

Umbrella industry is essentially an assembling industry. The manufacturers obtain different parts of an umbrella from different manufacturing units and assemble them to make finished umbrellas.

Umbrella ribs: Three kinds of ribs are made in India. These are (i) Solid (ii) hollow or fluted, and (iii) flexuous.

i) Solid ribs are made in two different types, viz., main ribs which have circular cross-section and cross-ribs or stretchers which have square cross-sections;

ii) Hollow or fluted ribs have a channel section both for the main ribs and for the stretchers. The manufacturing procedure for these ribs is similar to that for solid ribs upto cutting of wires to standard lengths. The cut wires are then fluted in different types of dies and finally joined together to form the frame work of an umbrella.

iii) Flexuous ribs contain two parts, main ribs and a pair of stretchers joined together in a frame. When the umbrella is stretched, these stretchers bend to give a petal like appearance.

Umbrella Tubes: These may be made from wood or steel. In the case of wood, long sticks are produced from the recommended species of wood, rounded and cut to standard lengths.

One end of the stick is sharpened and covered with metal casing; the other end is bent by steam or heat to give a U-shaped handle. The sticks are then polished. Weak and inferior quality sticks are hollowed along the axis of the stick and shed wires are inserted to strengthen them. In case of steel, long rods of steel are cut to standard lengths in shearing machines, tapered at both ends. Two holes are punched, one at the top and the other just above the ferrule for accommodating panel pins, wooden or plastic handles are then fixed to the bottom end of the steel tube.

Umbrella Cloth: At first, good quality yarn is selected after rigorous tests conducted to determine its strength and other related properties. It is subjected to winding, warping, sizing and weaving operations. The prepared cloth is padded through a dyebath containing aniline black; the dyed cloth is semidried and then passed through a hot flue, where the colour of the cloth changes into green. The green cloth is sent through a jigger or a sopper containing sodium bichromate, where it is chemically oxidised to attain the black colour.

## Standards

The size of umbrella ribs may vary between 37.5 cm (15 in.) and 62.5 cm (25 in.) depending on the use to which it is put. Fancy umbrellas contain ribs of length 37.5 cm; children umbrellas have ribs of lengths between 37.5 cm. and 42.5 cm. (1 (17 in.); umbrellas for ladies consist of ribs of length varying between 47.5 cm (19 in.) and 52.5 cm (21 in.); and those for men have ribs of length between 57.5 cm (23 in.) and 62.5 cms.

Seven specifications have been brought out by the ISI on umbrellas, their parts and raw materials. These are on umbrellas (IS: 2920), water proofed cotton umbrella cloth (IS: 2457) umbrella fittings (IS: 2919), umbrella ribs (IS: 4223). Umbrella stems/tubes, sticks and handles (IS: 2918) and non-water proofed cotton drill for umbrellas (IS: 2613).

## Production

Production figures of umbrella ribs during 1974-76 are as follows:

| Period | Qty. in '000 Doz. | Value in Rs lakhs |
|---|---|---|
| 1974 | 344.9 | 49.82 |
| 1975 | 250 | 45.00 |
| 1976 | 348.13 | 62. |

## EXPORTS

Indian umbrellas and their parts are exported mostly to Asian and African countries. Some exports are also made to France, West Germany, Italy and USA.

The export figures of umbrella plastic handles, other umbrella handles, umbrella ribs, other umbrella fittings and umbrellas sunshade for 3 years are as follows.

Umbrella Plastic Handles

| Period | Qty | Value in Rs |
|---|---|---|
| 1975-76 | 69380 Nos. | 224193 |
| 1976-77 | 15567 Nos. | 49231 |
| 1977-78 | 48553 Nos. | 116303 |

Other umbrella handles

| | | |
|---|---|---|
| 1975-76 | 3505 Nos. | 14811 |
| 1976-77 | 10415 Nos. | 57569 |
| 1977-78 | 15536 Kgs. | 258155 |

Umbrella Ribs

| Period | Qty. Kgs. | Value in Rs |
|---|---|---|
| 1975-76 | 35394 | 268929 |
| 1976-77 | 280237 | 1991651 |
| 1977-78 | 274243 | 2446256 |

Umbrella Fittings

| | | |
|---|---|---|
| 1975-76 | 44804 | 750326 |
| 1976-77 | 46203 | 677004 |
| 1977-78 | 67658 | 988266 |

Umbrellas & Sunshade

| Period | Qty. | Value in Rs |
|---|---|---|
| 1975-76 | 135098 Nos. | 1260419 |
| 1976-77 | 318415 Nos. | 3269866 |
| 1977-78 | 162020 Nos. | 1819854 |

## Imports

Import figures of umbrella fittings during 1974-78 are given in the following table.

| Period | Qty. in Kg. | Value in Rs. |
|---|---|---|
| 1974-75 | 11625 | 214937 |
| 1975-76 | 3080 | 72101 |
| 1976-77 | 82535 | 1465009 |
| 1977-78 | 122334 | 2122575 |

## Conclusion

The umbrella industry has immense potential for growth both domestically and in the sphere of exports. The consumption levels in the country are so abysmally low that the market can almost be indefinitely expanded. Also, with a little effort and enhanced incentives, exports could easily be stepped up to Rs one crore in the first instance.

Expanding domestic sales will prove a little more difficult. Exercises need to be initiated to see if the prices can be brought down. Most of the units in the industry are too small to benefit from the economics of scale. It would be in the best interests of both the industry and the consumers if the small units were merged to form economically viable ones. This would not only improve efficiency but also will have a salutary impact on prices (BCR).

# Current Technical Literature

## SCIENCE AND TECHNOLOGY

### Small Industry

68. ----: Export potential of small sector. Chemical Weekly, 1980, 26(1), 83, 84.

Outlines the export performance of small scale sector for the period 1975-78. (MSR)

69. ----: Managerial problems of small scale industries. Colour and Chemical Weekly, 1980, 6(32), 29, 31-34.

Identifies five major managerial problems of small firms: Organization, planning and decision making, production planning and control, financial management, marketing management and personal relations and discusses each of them. (CV)

70. ----: Sickness in small sector. Chemical Weekly, 1980, 25(48), 58.

It is estimated that about 60% of industries in small scale sector are sick. Outlines the cause of sickness and the role of financial institute in reviving these units. (MSR)

71. PATANKAR, A.D.: Ancillary and auxiliary industry. Chemical Weekly, 1980, 26(5), 66-68.

Brings out the advantages of decentralised industrial set up and describes how to plan and implement an ancillary unit. Stresses the role of DIC in the setting up of these units. (MSR)

72. SAHNEY, M.: Sickness in small sector. Chemical Weekly, 1980, 25(49), 72, 74.

Describes the state of affairs of small industry sickness and discusses the possible role that the banks can play in reviving the sick units. (MSR)

73. SAHNEY, M.: Starting a small scale unit-some do's and dont's. Chemical Weekly, 1980, 25(51), 75-76.

Outlines the factors that an entrepreneur must know in order to be a successful businessman. (MSR)

74. VEPA, R.K.: Focus on small units - new growth policy. Chemical Weekly, 1980, 25(49), 70, 72.

Explains how the new industrial policy statement will enhance the growth of small industries in India. (MSR)

## RESOURCES

### Energy Sources

75. ----: Solar photo voltaic water pumping system. Agriculture & Agro-Industries Journal, 1979, 12(6), 30-32.

The solar energy reaching earth's surface is so immense that a very small function of this (0.02 per cent) only would be sufficient to meet the world's energy requirement. India is rich in sunshine and decentralised, pollution-free power systems based on solar energy can be set up. The photovoltaic process in which sunlight is directly converted to electricity is a versatile approach. It can be used to lift water trapped in the rocks below the surface of the earth with the help of solar photovoltaic water pumping system.

76. JAIN, M.C.: Low cost burners for biogas. Indian Farming, 1980, 30(1), 20-22.

Brief developments, standards, design of burner, construction and special feature of burner are reported with 8 diagrams showing different views and also discusses the adaptability to different arrangements. (MKSS)

## TEXTILE AND FIBRE INDUSTRIES

77. ----: Export of hosiery and knitwear. Hosiery & Textile Journal, 1980, 48(3), 10.

Gives the exports of hosiery and knitwear of cotton, wool and synthetics from 1975 to 1979. (BS)

78. ----: Exports of natural silk goods. (Export performance during 1979-80). Hosiery and Textile Journal, 1980, 48(5), 17-18.

Reviews the export trends during the year 1979-80 giving country-wise and varietywise statistics of mulberry and Tasar silks. (BS)

79. ----: Industry profile - Garment industry facing an imbroglio. Industrial News Digest, 1979, 2(4), 1-3.

There was hardly any mention of a garment industry in the IV Plan. It just erupted into the industrial scene of the seventies, and by 1977-78 had grown into a major export earner. The present capacity of the garment industry is estimated at about 75 crore pieces valued at over ₨ 760 crores. The capacity utilisation is said to be about 60%. The raw material used, the products manufactured, production and consumption, and export of garments are discussed. (JBS)

80. ----: Knitwear dictionary for ready reference. Knitting Times, 1980, 49(2), 44-48.

Gives a list of terms together with the meaning.

81. BRADY, P.R. & HINE, R.J.: Pigment printing of wool: American Dyestuff Reporter, 1980, 69(2), 23-24.

This report describes a method for the pigment printing of chlorinated wool fabric in a range of colours of high lightfastness. The method is inexpensive and uses readily available proprietary products. It is particularly suitable for printing small motifs on fabric lengths or garments.

82. GOSH, S.S.: New technologies of tasar silk reeling. Indian Silk, 1980, 18(9), 21, 23 & 25.

83. KRISHNASWAMY, S.: Chawki rearing, improved method of rearing young-age (Chawki) silkworms-I. Indian Silk, 1980, 18(9), 11, 13, 15, 17, 19.

Discusses in detail the techniques involved in chawki rearing and equipments needed. (BS)

## OILS AND FATS

84. LYTHGOE, N.F.: A century of dyeing oils. Polymers Paint and Colour Journal, 1979, 169(4001), 507-508, 510-512.

The last hundred years have seen many improvements in the production and presentation of vegetable oils as raw materials to the technical user. These modifications have occured across the complete spectrum, the types of seeds, growing, crushing, and finally the presentation to the user. This review is an attempt to outline some of the major changes.

85. ----: The Vanaspati industry in India - Problems and prospects. Industrial Researcher, 1980, 7(2), 97-103.

There are 86 units in the country with an installed capacity of 14 lakh tonnes per annum, but the effective capacity is only 8 lakh tonnes. The chronic shortage of raw materials, power etc., and the need for a long term policy framework are emphasised. A list of vanaspati factories with their installed capacities is given.

## PACKAGING

86. DAY, F.T.: Selection and usages of packaging papers. Confectionary Production, 1978, 44(4), 149-150.

Reviews the factors and features which can influence the choice. (AA)

87. NAMATHOSURUP: What is packaging costs. Perfectpac, 1980, 20(7), 5-6.

Enumerates the different elements of packaging costs.

## CHEMICAL INDUSTRIES

88. ----: Assessment of demand for calcium carbide. Industrial Researcher, 1980, 7(2), 105-112.

Calcium carbide is a basic inorganic chemical at present being produced by 6 units in the country, with an installed capacity of 1.31 lakh tonnes. The status of the industry, imports and exports, the end-use industries, the present and future demand of calcium carbide are reviewed. (JBS)

89. ----: Chloralkali & soda ash industries: progress report April 1979-June 1980. The Chemical Times, 1980, 7(47), 8, 12 and 7(48), 3, 10.

Review of the chloralkali and soda ash industry is presented. (MSR)

90. ADHIA, J.D.: Chlor-alkali industry - Worldwide. Chemical Age of India, 1980, 31(5), 419-423.

Gives world production of caustic soda by major producers during 1970-1978, world chlorine producers, production capacity by cell type in recent times, change in trend from mercury to diaphragm/membrane cells and use pattern of chlorine and caustic soda. (BS)

91. CHAWALA, S.L.: Newer materials of construction in chlor-alkali plants. Chemical Age of India, 1980, 31(5), 571-574.

The paper, after bringing out the necessity of proper selection of materials of construction, considers various newer materials of construction like titanium and its alloys, various nickel alloys, ferritic and austenitic stainless steel, and non-metallic materials like PVC, polyethylene, high density polyethylene, and a range of fibre reinforced plastics, for the various streams and operating conditions encountered in chlor-alkali plants, both diaphragm and mercury cell plants.

92. EARTH, R.G.: Expansion/modernisation of chlor-alkali plants in India, Chemical Age of India, 1980, 31(1), 27-38.

Reviews the present situation of the caustic soda plants and highlights process of modernisation of some of the systems of existing plants.

93. RAMAIAH, B.B.: Scope for development in inorganic chemical industry in South India. Chemical Weekly, 1980, 25(18), 69-72.

Discusses the present status and future scope for the development of sulphuric acid, caustic soda, soda ash, titanium dioxide and calcium carbide. (BS)

94. RAVINDRANATH, K. & SAMPAT, S.: Recent developments in sulphuric acid plants. Chemical Engineering World, 1980, 15(7), 39-51.

Sulphuric acid process development is centered around reducing $SO_2$ emission level and maximising energy recovery with compact equipment having increased flexibility. This article briefly describes developments in process, equipment, heat recovery, material and pollution control aspects of sulphur burning plants employing contact process.

95. THAMPI, K.T.: Perspectives for eighties. Chemical Age of India, 1980, 31(1), 61-73.

Highlights the aspects - demand growth, present installed capacity, plants in the pipeline, possible shift in end-use pattern, increasing use for chlorine in organic field, specially for PVC, by-product HCl and HCl electrolysis, chlorine dioxide process, geographical locations of plants, transport of chlorine and caustic soda as 50% lye or flakes, optimum plant capacities for eighties, investment figures, raw material availability, salt washeries, process for brine purification, power supply and technological developments of chloralkali industry. (BS)

## DYES

96. ----: Acid dyes - A feasibility study. Industrial Researcher, 1980, 7(2), 131-141.

Acid dyes are used for the dyeing and printing of wool, silk and leather garments, particularly those with bright and fast colours. A demand supply gap of 935 tonnes of acid dyes by 1982-83 is estimated. A plant with a capacity of 5 tonnes per month has been proposed with a total project cost of ₨ 11.5 lakhs. The projected profitability ratios recommend this project for prospective entrepreneurs.

97. KENI, D & NARKAR, A.K.: Reactive dyes-some developments in printing, Colourage, 1979, 26(24), 27-30.

The one disadvantage of reactive dyes to be hydrolysed under alkaline conditions is overcome by developing different ranges of reactive dyes. Also several application techniques have been evolved.(CV)

98. SHENAI, V.A.: Textile auxiliaries based on methylamines. Textile Dyer & Printer, 1980, 13(7), 40-44.

Textile auxiliaries are classified and the place of methylamine-based products stressed. The synthesis of some of these products is briefly discussed. Their uses as dyeing agent, especially as retarding agents in dyeing acrylic fibres, as catalysts in dyeing reactive dyes on cellulosic fibres, as printing agent in the cases of vat and reactive dyes, as stripping agents used after faulty dyeing, germicides, cationic softners and detergents are described.

## SURFACE COATINGS

99. ----: Advances in coating 1980. A year of progress. PPI, 1980, 22(4), 43-52.

Mills around the world making coated paper and board ran full out last year to meet surging demand. But the costs of all materials rose as fast as paper prices. As a result, mills are shopping carefully for raw materials-fibre and chemical products-which will do the best job at the lowest price. Chemical suppliers are replying with products more tailor-made to fill specific needs.

100. COLCLOUGH, M.L et al: A low shear viscometer: An instrument for measuring flow and sag resistance in coatings. Journal of the Oil and Colour Chemists Association, 1980, 63(5), 183-193.

A new low shear viscometer (LSV) of robust design is described. The instrument provides a method of assessing the flow-out characteristics of coating materials by simulating the rheological conditions under which surface perturbations caused by application processes, such as brushing or roll coating, are removed.

101. FERGUSON, J.P.: Trends in formulating paints and printing inks. Paint Manufacture, 1979, 49(5), 13 & 33.

An instrumental formulation system consisting of a colour measuring instrument, a small computer with a data storage medium and a series of special programmes of instrumental formulation to the advantage of manufacturer is discussed. (KSDR)

102. FREEMAN, D.B.: Pretreatment for electropaint-the facts. Polymers Paint and Colour Journal, 1979, 169(4006), 748, 750-752, 754, 757.

103. FROGGATT, J.J.: Preservation, priming, putty and paint. Journal of the Oil and Colour Chemists Association, 1980, 63(6), 237-242.

Some of the major factors in the painting of external woodwork, particularly windows, are considered. The principal cause of paint failure and wood decay is the movement at the joints of the lower transome of windows, which allows the ingress of water into the end-grains of the timber. The properties of linseed oil putty and its manufacture are described, its role in sealing the glass into frames and the importance of its adequate and sufficiently frequent repainting are discussed.

104. O'NEILL, L.A.: Technical developments in the paint industry-state-of the art 1979. Polymers Paint and Colour Journal, 1979, 169(4006), 746-748.

## PLASTICS

105. ----: Export prospects for PVC and polythylene fittings. Popular Plastics & Rubber, 1980, 25(6), 28-29.

106. ATHALYE, A.S.: Re-use of plastics. Plastic Annual, 1979, 27-33.

Indicates the conventional process of recycling of scrap and highlights some of the new processes developed in other countries. (KSDR)

107. GURURAJA RAO, T.R.: Ultrasonic plastics assembly. Plastics Annual, 1979, 39-44.

The ultrasonic plastic assembly is a technique used for assembling plastic to plastic, plastic to metal and plastic to other non-plastics. It comprises of; plastic welding, staking and metal inserting. Details of welding, staking and inserting process and different types of common joint configuration are shown. (KSDR)

108. SINGHAL, S & ANAND, A.: Polyurethane shoe soles. Leather Processing, 1980, 3(8), 21-22.

Discusses the advantages of polyurethane shoe soles, their composition and processing. (BS)

109. VARGHESE KAT: Paper-like film from high density polyethylene. Plastics Annual, 1979, 34-38.

High molecular weight high density polyethylene film (HM film) or popularly known as paper-like film is one of the promising developments in the field of HDPE applications. Special design features for the equipment is highlighted. The properties of HM film and application fields are indicated. (KSDR)

110. VENKATASUBRAMANIAN, K.N.: Estimates of demand of plastics raw materials. Plastirama, 1979, 19(2), 6-7.

Gives the statistical data on projected demand of plastics for 1982-83, 1983-84 and 1987-88. (KSDR)

## LEATHER INDUSTRY

111. ----: Danish shoe industry. Indian Footwear, 1980, 4(4), 17-24.

Discusses the aspects of production, consumption, marketing and prices, and foreign trade. (BS)

112. ----: Industry profile - Leather and footwear machinery industry. Industrial News Digest, 1980, 3(8), 3-4.

The leather and footwear machinery industry in India is of recent origin. As a considerable part of the production in the leather goods industry comes from the cottage and small scale sectors where sophisticated machinery is not much utilised, the demand for leather and footwear machinery was not very encouraging in the past. With the recent emphasis on improved production methods and quality products for export, the demand for leather footwear machinery is increasing. The status and scope of the industry is briefly reviewed. (JBS)

----: The leather industry in Indonesia. Leather Processing, 1980, 3(12), 17-18.

----: Market survey of the Danish shoe industry. Leathers, 1980, 22(4), 21-30.

Reviews the production and consumption trends, retail structure of the industry, overall trends in manufacturing sector and Indian approach to Danish market. (BS)

ALFORD, P.: Some practical aspects of pigskin manufacture. The Leather Manufacturer, 1980, 98(2), 24-29.

BANSAL, A.S.: Marketing assistance to shoe makers under the schemes of Khadi and Village Industries Commission. Leather Processing, 1979, 3(4), 19-20.

The KVIC introduced the scheme for setting up footwear, leather goods sales shops during year 1972-73. It was envisaged that a chain of sales shops will be set up throughout the country through cooperative societies of the artisans or registered institutions or State Boards. The implementation of these schemes and the pattern of financial assistance for these shops are discussed. (BS) ne

DORAIRAJ, P.L & KAMAT, D.H.: Modification of chamois leather for garment purposes. Leather Science, 1980, 27(4), 121-125.

Chamois, as garment leather, has certain disadvantageous properties such as less shape retention, high water absorption and low shrinkage temperature. By retanning the leather with 20% chrome extract (on dry weight of leather) it is possible to overcome these undesirable properties to a great extent making the leather suitable for normal dyeing or screen printing and thus rendering it suitable for garment manufacture.

DURAIVELAN, C.K.: Indian leather industry in 2000 AD. Leathers, 1980, 22(4), 3-8.

Reviews the status of the leather industry highlighting the aspects of cattle population, raw materials situation, trading of leather footwear and leather goods industry, R & D and pollution control. (BS)

119. GUPTA, K.B et al: Kavalai or water bucket leather. Leather Science, 1980, 27(3), 94-95.

Kavalai leather is used for manufacture of water bucket. It was quite popular for agricultural purposes before pumpsets were introduced. Even today, where electricity is not available or a farmer cannot afford to purchase a pumpset, kavalai leather buckets are used. A process for the manufacture kavalai leather is described.

120. KHANNA, J.K et al: Utilisation of dry chrome splits by rewetting for school satchels. Leather Science, 1980, 27(4), 133-134.

121. KLUGAR, J.: Two decades of leather finishing. Leather, 1980, 182(4458), 97-99.

Brings out the differences in leather finishing in the US, Europe and South America and enumerates new ways of leather finishing highlighting polyurethane water dispersions and other finishing ideas.(BS)

122. STONE, J.: Simple shoemaking machine bridge the technology gap. Leather Processing, 1980, 3(12), 15-16.

MINERAL BASED INDUSTRIES

123. ----: Materials for electronic/industrial & newer ceramics. Ceramic Industry, 1980, 114(1), 31-115.

Enumerates the different ceramic materials together with their properties, occurence and applications. (BS)

124. BANERJEE, S.K.: Energy crisis and the future of glass and ceramic industries in India. Part I. Transactions of the Indian Ceramic Society, 1979, 38(1), 31-43.

An attempt has been made to investigate the various sources of energy and their relative consumptions in various branches of glass and ceramic industries in India. The different types of kilns and furnaces used in ceramic industry and their designs with respect to various items produced have also been described. The latest trend in shorter firing cycles and lower firing temperature (except for refractories) to conserve energy and the effect of continuous rise in fuel prices, e.g., coal, furnace oil, kerosene, gas and electricity during the last 20 yea on the prices of various ceramic products like sanitaryware, tile, tablewares, insulators etc., have been studied. Suggestions have been made with respect to new designs and operational techniques in ceramic tunnel kiln to improve efficiency and reduce energy consumption in them. (AA)

## MECHANICAL ENGINEERING

125. ----: Machine tools; scope for expansion. Engineering World, 1979, 9(1), 69-76.

Gives present status and future scope of machine tools, hand tools, forged hand tools, and production during the last four years. (KLR)

126. CHADHA, B.R.: Anti-seizure for diesel engines. Invention Intelligence, 1980, 15(4), 159.

The mechanical device called anti-seizure prevents engine seizure when the pressure of the lubricating oil drops below the permitted limit or when its flow stops altogether.

127. FERNANDES, A.: Pneumatic tools-their utility and development in India. Engineering World, 1979, 9(1), 77-81.

Gives the development and utility of pneumatic tools like drills, grinders, riveters, rivet cutters, impact wrenches, hammers, rammers etc.

128. PHALNIKAR, C.A.: Indian machine tools industry-a review. Engineering World, 1979, 9(1), 33-38.

Gives the statistical details of production, imports and exports with the help of a table. (KLR)

129. RAMESH, B.K.: Angle-cutter for pipes. Invention Intelligence, 1980, 15(1), 27-28.

The device makes cutting of pipes at the required angle an easy task. Basically, it serves to provide a guide to the hacksaw and reduces chances of breakage of the hacksaw blade.

130. ROBSON, A.A.: Modern electroformed nickel molds. Fabrication techniques and application. Plastics Design and Processing, 1979, 19(2), 39-43.

Indicates the general advantages and applications of electroforming. (KSDR)

131. ----: Review of trend in availability and growth for Aluminium industry. Industrial Researcher, 1980, 7(2), 75-79.

Presents a survey of properties, usages and processes in the manufacture of aluminium in the world and outlines the trend in production and the capacity in India.

132. ----: Welding engineer data sheet no. 477 - Arc welding safety precautions. Welding Design and Fabrication, 1980, 53(6), 92.

133. KARNAD, S.S.: Welding processes and equipment. Tools & Alloy Steels, 1979, 13(7), 241-245.

Describes the various arc welding processes, namely manual metal arc welding with coated electrodes, gas tungsten-arc welding, gas metal-arc welding and submerged arc welding. (CS)

134. RAI, M & SRIVASTAVA, R.S.: Utilization of waste zinc tailings in making cellular concrete. Research and Industry, 1979, 24(4), 226- 228.

Large quantities of zinc tailings pile up as by-product waste near-zinc mines posing a serious disposal problem. It has been established that the tailings can be used for making cellular concrete of both insulation and structural grades using aluminium powder or a foaming agent as the gas producing additive. (AA)

# SENDOC Services

Featured in this section are technical enquiries that were received and the services rendered by SENDOC during the month of January 1981. The charges for short technical enquiries will be ₨ 5.00 to ₨ 10.00 per typed page. Industry profiles already available with SENDOC are charged at the rate of ₨ 10.00 each.

| S.No. | Enquirer | Service Rendered |
|---|---|---|
| 1. | IC, Cuddapah, Andhra Pradesh | Profile on: Electrical Motors. |
| 2. | Ent., Andhra Pradesh | Profile on: Cotton seed oil, Biscuits, Sodium sulphate, Sodium thiosulphate, Synthetic detergent powder, Ammonia paper, Leather tanning, Absolute alcohol. |
| 3. | Ent., Gujarat | Profiles on: Emery grits, Sand paper. |
| 4. | Ent., Karnataka | Profiles on: Cattle feed, Poultry feed. |
| 5. | Ent., Maharashtra | Profiles on: Chlorine ampoules, Ethyl alcohol, Caustic soda, Jute twine, Bleaching powder. |
| 6. | Ent., Orissa | Profile on: Table salt. |
| 7. | FI, Orissa | Profile on: Steel rerolling mill. |
| 8. | GD, Tamil Nadu | Profile on: Activated carbon from coconut shells. |
| 9. | SI, Andhra Pradesh | Profiles on: Plastic articles, Printing ink, Cattle feed, Poultry feed, Cement paint, Synthetic resins, Stoneware pipes. |

| S.No. | Enquirer | Service Rendered |
|---|---|---|
| 10. | SI, Bihar | Profile on: Diethyl ether. |
| 11. | SI, Maharashtra | Profile on; Washing soap, Electric brass lamp holders. |
| 12. | SI, Orissa | Profile on: Card board, Ferric alum, Minerals grinding. |
| 13. | SI, Rajasthan | Profile on: Salt glazed sewer pipes. |

Note: DIC - District Industries Centre
Ent.- Entrepreneur
FI - Financial Institution
GD - Government Department
SI - Small Industry.

# New Products and Processes

## AGRO-BASED INDUSTRIES

### Active Carbon from Coconut Shell

Active carbon obtained from coconut shell is of gas absorbent grade. This carbon is used in fertilizer and rayon industry for recovery of solvents and in gas masks for gas absorption.

At present good quality gas absorbent carbon is not being made in the country and the requirements are being met by imports.

Regional Research Laboratory, Hyderabad has developed a process for production of gas absorbent carbon using coconut shell, an abundantly available raw material. The process consists of crushing the coconut shell in a hammer mill to the required size and then pulverising in a ball mill. The shell powder is digested with zinc chloride and hydrochloric acid. The mass is pelletised and dried. The pellets are then heated at elevated temperature. Activated pellets are quenched and leached counter currently by dilute hydrocholoric acid and dried in a tray drier.

The process has been tried out on a pilot plant having capacity of 100 kg. of coconut shell per day. The raw materials required are coconut shell, zinc chloride, hydrochloric acid and binder. All these are indigenously available.

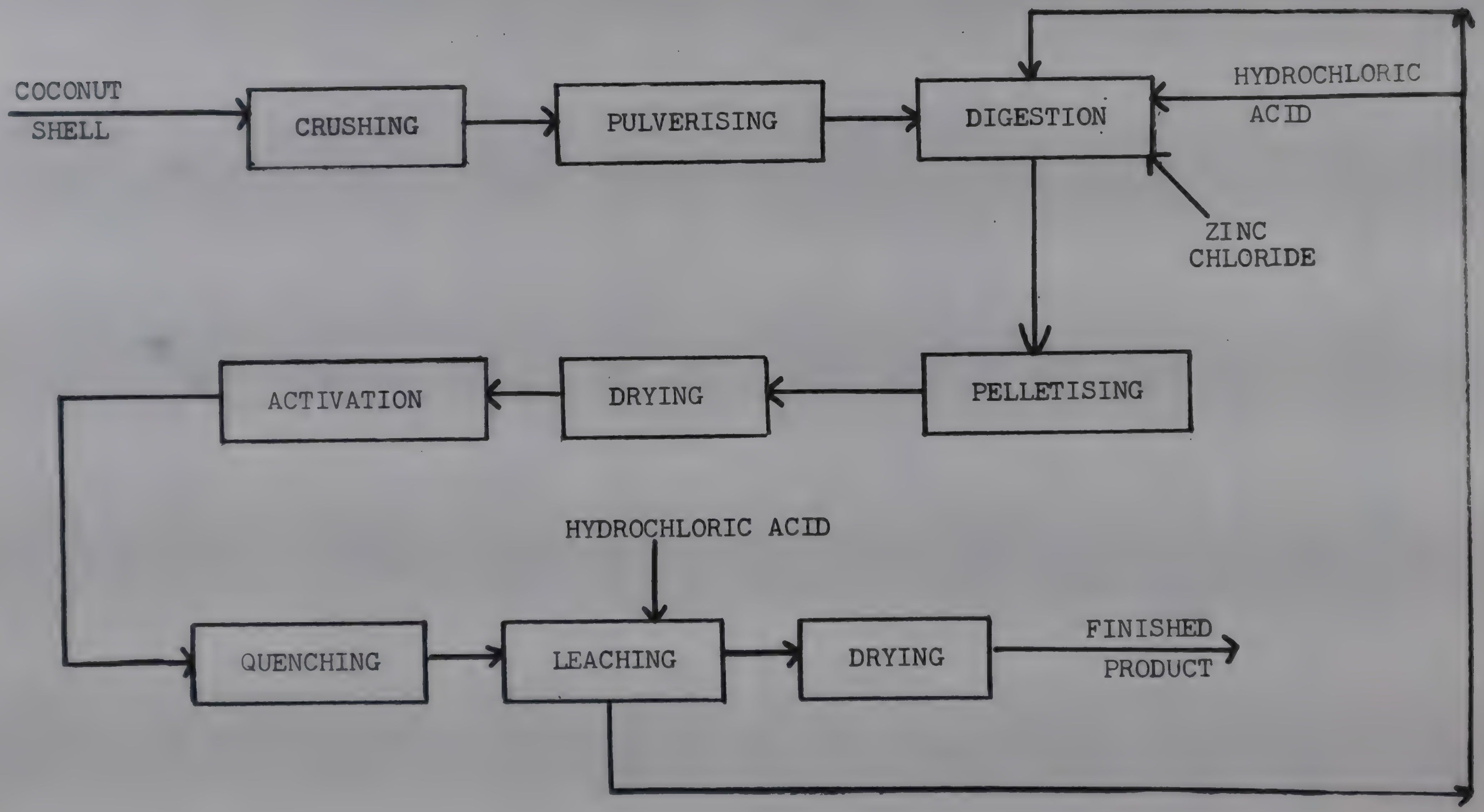
The main items of equipment required are: hammer mill, ball mill, storage bunkers, digestion vessel, activation unit, filter, tray dryer, mixer, pelletiser, boiler, leaching tanks, etc. All these are available indigenously.

For a plant having a capacity of one tonne of active carbon per day (3 shifts) the total investment is estimated at ₨ 2 million (excluding land & building). About 60 persons are required for operation of the plant. It has been licensed to one party who has commenced trial production.

### Coir Waste Wood Wool Corrugated Roofing Sheets

It has been found that wood wool and coir waste can be converted into suitable corrugated roofing sheets. Wood wool largely used as packing material is obtained mostly from soft woods such as fir, chir and deodar which give good quality fibre of suitable length, thickness and width. Use of hard woods for wool requires judicious selection as many of them poison the setting and strength.

# BLOCK FLOW DIAGRAM FOR ACTIVE CARBON FROM COCONUT SHELL


COCONUT SHELL
CRUSHING
PULVERISING
DIGESTION
HYDROCHLORIC ACID
ZINC CHLORIDE
PELLETISING
DRYING
ACTIVATION
HYDROCHLORIC ACID
QUENCHING
LEACHING
DRYING
FINISHED PRODUCT

Coir waste is a by-product of coconuts. The current production of coconut in India is estimated at 6000 million nuts. About 50% of the husk is used for making coir mat and cushions. The other half which may be considered as potential industrial raw materials, is mostly used as fuel. Shearing waste 'baby fibre' and coconut pith also account for a large amount of industrial waste.

Unlike other cellulosic materials, coconut fibre is free from water soluble polyphenols and makes a strong board with portland cement. This property of the fibre and the pith has been utilised in making corrugated roofing sheet.

Coir waste, wood wool fibre and cement are mixed and a mat of suitable thickness is formed onto a corrugated mould and pressed. After demoulding the sheet is cured and dried.

These sheets have good fire resistance and low water permeability through the coated side. The water absorption is comparable with that of A.C.roofing sheets. Insulation property is much better, the thermal conductivity being approximately one third of that of the A.C. roofing sheets.

The physical properties of these sheets and asbestos cement sheets are summarised in the table below:

Table: Comparison of Properties

| S.No. | Property | Coir Fibre Sheet | A.C. Sheet |
|---|---|---|---|
| 1. | Pitch of Corrugation (mm) | 130 | 146 |
| 2. | Depth of Corrugation (mm) | 44 | 48 |
| 3. | Length of the Sheet | 1.5 | 1.5 to 3.0 |
| 4. | Breadth (m) | 0.85 | 1.05 |
| 5. | Thickness (mm) | 8 | 6 |
| 6. | Weight ($kg/cm^2$) | 11.0 | 13.5 |
| 7. | Breaking load ($kg/cm^2$) | | |
| | i) at 1 m span | 1.6 | 5.0 |
| | ii) at 50-60 cm span | 5.0 | N.A |

## Special Features

1. Wood wool coir fibre corrugated sheet requires 30 per cent less cement as compared to asbestos cement sheet.

2. The sheets are light and tough and possess good tensile strength. They can be carried over hilly and rough roads without any breakage.

3. The sheets possess good thermal insulation properties and as such are expected to provide greater comfort in tropics as compared to A.C sheet and G.I. sheet. They also possess fire resistant characteristics.

4. Their preparation needs neither heavy machinery nor high capital investment. The sheets are 50% cheaper than A.C. sheets.

5. The sheets can be laid on roofs like A.C. sheets and the roof so made does not require any further finishing or water proofing treatment.

More than 100 boards of 2 m x 1/2 m x 25 mm size were made. These boards meet IS Specification 3308 of 1969.

The main raw materials required are coir waste, wood wool and cement. These are available indigenously. The main items of equipment are moulds and a hydraulic press. The hydraulic press may have to be imported.

A plant to produce 45 sheets per day of 150 x 90 cm is considered the minimum economic size. The capital investment for a plant of this size is estimated at Rs 0.2 million, excluding land and buildings. About 10 persons are needed per shift. Process developed by the Central Building Research Institute, Roorkee, U.P. has been licensed to six parties, of which one is already in production and others are in various stages of implementation.

## Gaskets from Coir Pith

Gaskets are generally made from cork granules which are imported. Coir pith available as waste from coir industry has been found to be suitable for making gaskets. These gaskets can be used in place of gaskets from cork granules in automobile engines and other similar equipment. There is no data available on demand for such gaskets, but it is felt that the present demand of gaskets is low because of the imported raw materials and in view of the general restriction on imports. It is hoped, once these gaskets are made from indigenously available coir pith, the demand will pick up.

National Chemical Laboratory (NCL), Poona has developed a process for manufacture of the gaskets from coir pith. The method of manufacture is mostly similar to that from cork granules. The following steps are involved in the manufacturing process:

a) Mixing of coir pith with synthetic rubber such as neoprene and other ingredients.

b) Vulcanizing the mix in suitable mould under pressure.

Gaskets of 18" x 18" have been produced using the above process at NCL. The samples have been tested and found to meet the desired specifications.

Coir pith and neoprene are the main raw materials required for the preparation of gaskets from coir pith. Except neoprene, all other raw materials are indigenously available. Coir pith is a waste available from the coir industry.

The major items of equipment needed are, mixing mill and hydraulic press. These are either easily available or can be fabricated indigenously. A plant having a capacity to produce 5 tonnes of the finished products per annum based on 3 tonnes of coir pith, is estimated to need an investment of ₨ 1 million (excluding land and building). For operation of the unit four persons are required. The process has been licensed to one party. The firm is in production.

## DRUGS AND PHRAMACEUTICALS

### Fungal Acid Protease

The product can be used as: (i) an acid bating agent in leather manufacture, (ii) an aid to gastric digestion of proteins in place of pepsin for patients suffering from dyspepsia. It can also be used for the preparation of protein hydrolysates useful in animal and human nutrition and as nutrient media for micro-organisms.

The enzyme product is active in the acidic pH range of pickle baths in leather manufacture. Hence, by using Fungal Acid Protease (FAP), bating and pickling can be combined into one step, thereby saving time, labour and most important of all, electricity. Also, bating can be done at room temperature. In the manufacture of furs, acid bates are preferable to alkaline bates.

Fungi are simple plants which contain no chlorophyll and are used in brewing and baking, for the production of antibiotics etc.

In the process developed by the Indian Institute of Experimental Medicine, Calcutta, fungus is grown on a solid medium made up of bran, acid and water, spread out on enamel dishes. Under certain conditions of time (usually five days) and temperature (24°-26°C), incubation is carried out. The whole culture is then dried and ground to powder. This powder, after suitable dilution, is used as a bating agent in leather manufacture.

For other uses as a digestive aid and for the preparation of protein hydrolysates, the enzyme is purified in the following way: The whole solid fungal culture is extracted with acidified water and filtered. The filtrate is then subjected to fractionation with ammonium sulphate. The enzyme acid protease precipitates in 40 to 80% saturation of the salt. This is then collected by centrifugation and dried.

About 400 tonnes of bating agent are consumed per annum in India. The amounts of pepsin and pancreatin consumed come to 7 tonnes and 90 tonnes per annum, respectively (for various proteolytic uses, including the medicinal use as digestive aid). According to one estimate, about ₨ 30 million worth of digestive preparations are sold in India annually.

A small amount of bating enzyme is being produced in the country. The rest is being imported. There is no indigenous production of pepsin and pancreatin on a commercial scale. Very recently a firm has started producing an enzyme having acid protease activity, but the product is less active and less stable at low pH. The current market price of bating agent is about ₨ 8/- per kg.

The process has been studied for a period of 6 months in a pilot plant of the capacity of 10 kg. of active product (crude powder) per day or of 30 kg of diluted product per day of one shift, the latter being equivalent to imported bating agent in activity. For dilution, wheat bran or de-oiled rice bran or commercial grade ammonium sulphate can be used.

The partially purified product compares favourably with pepsin (IP) with regard to its proteolytic effect on haemoglobin, casein, groundnut cake, mustard cake and mutton. It can be diluted 3 times (to an activity of 50 Hb units/mg.) to make it equivalent to I.P. pepsin.

All the equipments involved can be made indigenously and are available from some of the leading firms like Macneill and Barry, Larsen & Toubro, Pioneering Engineering Co., Bombay etc. The list of equipments is as follows:

| For acid bate quality | For digestive aid quality |
|---|---|
| a) Kneader | Items a to e same as for acid bate |
| b) Enamel dishes and aluminium or G.I. covers | Centrifuge-cum-extractor |
| c) Autoclave | |
| d) Air conditioners (two) | |
| e) Drying oven or fluid bed dryer | |
| f) Grinder | |

The chief raw materials, namely wheat bran, bran and an acid, are readily available indigenously.

For acid bate: The techno-economics has been calculated for a commercially viable and technically feasible plant of the capacity of 18 tons of acid bate annually (300 working days) or 60 kg/day of 2 shifts. The cost of machinery is estimated at ₨ 70,000 and a working capital of ₨ 20,000 (including the cost of 6 tonnes of wheat bran and 60 litres of Orthophosphoric acid (85%) for 3 months is required.

For digestive aid grade: Based partly on pilot plant work and partly on lab. scale work: For 30 kg/month capacity plant, the cost of machinery is estimated at ₨ 65,000 and the working capital, inclusive of the cost of raw materials like wheat bran (2250 kg), orthophosphoric acid (75 litres) and ammonium sulphate (3.6 tonnes), works out to ₨ 21,000 for 3 months.

## Gelatin Optical Filter

The gelatin filters are used for various purposes: for example they are widely used in apparatus using optical devices, commonly used by laboratories such as photometers; cameras; Spectrometers, Polarimeters; Colorimeters, etc. At the same time they are also used for commercial purposes such as eye protective glasses used by Defence as well as industrial and civilian purposes.

These filters are not known to be produced in the country at present, and as such, it is difficult to give an exact figure of their annual demand. However, in view of its wide use, it is felt that the annual requirement of these filters will be of the order of 5000 to 6000 pieces of different sizes and wave length.

As per the process developed at the Indian Institute of Experimental Medicine (IIEM), Calcutta, a coloured gelatin layer is sandwiched between two fine glass plates. The main stress is laid on the selection of dyes for getting a monochromatic light band pass, which singly or in superimposition with others, give quite a good monochromatic light of tolerable half band width.

Filters of different wavelength ranging from 400 mµ to 700 mµ have been successfully produced by the laboratory.

Machinery and equipment required are: Air conditioning to maintain constant room temperature; Chemical balance; Oven; Laboratory ancillaries like Pipette test tubes, beaker etc; Centrifuges; and Spectrophotometer.

All the instruments except the last one are indigenously available.

The raw materials required are: dyes, gelatin powder, glass, paints etc.

Some samples have been prepared by the laboratory and found to withstand the different tests carried out by the laboratory.

The total estimated investment for the production of 6000 filters per annum of 300 working days of 2 shifts a day is ₨ 2,14,500 with the following break-up.

| | |
|---|---|
| Land and Building.....A four room set of 10' x 10' area per room | (₨ 90,000) |
| Machinery and Equipment | ₨ 49,500 |
| Working Capital | ₨ 75,000 |

If average cost of a filter is considered to be merely ₨ 50.00 (as compared to ₨ 250.00 to ₨ 350.00 per piece for size 1" x 1½" and ₨ 1000.00 for sizes 2" x 2") for imported filters, the estimated profit will be of the value of 92%.

## ENGINEERING INDUSTRIES

### Bench Drilling Machine

This machine is intended for drilling operations in piece as well as batch production. Large range of speeds arranged in geometric progression enable economic drilling upto a maximum of 13 mm dia in all normally used materials.

The spindle head can be rotated around the column, and clamped in the required position.

Two options are provided in the design. In the first, the motor is a single speed motor and the individual speeds are obtained by shifting the belt and by interchanging the pulleys between the spindle and motor shaft. An arrangement for easy interchangeability of pulleys is provided. In the second option, a two speed motor drives the spindle. Individual speeds can be obtained by selecting the proper speed of the motor and shifting the belt on the pulleys.

Specifications

| | |
|---|---|
| Drilling dia Maximum - mm | 13 |
| Max. Spindle travel - mm | 130 |
| Spindle taper (outside) - mm | B16 (MT2) |
| Spindle head traverse - mm | 250 |
| Spindle axis column face - mm | 220 |
| Drill chuck to table Maximum - mm | 440 |
| Minimum - mm | 20 |
| Clamping area of table - mm | 250 x 320 |
| No. of Speeds | 6/7 |
| Range of Speeds | 450-4500/500-4000 |
| Feed | Hand |
| Drive motor Kw | 0.55/0.57 |

For details Contact: Central Machine Tools Institute, Tumkur Road, Bangalore - 560 022.

## Magnetocam Grinding Machine

The make and break contacts in motorcycle and scooter engines are made by Magnetocams. The efficiency, fuel consumption and acceleration of the vehicle are dictated by the profile accuracy of these cams. Grinding the profile of the cam on high volume production basis either by using expensive conventional cam shaft grinder or using attachments on standard cylindrical grinder is not economically feasible. The Central Machine Tools Institute (CMTI), has designed and developed a special machine for this purpose.

The machine utilizes the 'Rocker Type Copying' principle. The master cam is forced against a freely rotating follower by a spring. As the work spindle rotates, the master-cam rocks the work spindle about a fulcrum and feeds the workpiece on to the grinding wheel, thereby generating the profile. The master cam can also be ground on the machine itself by 'Reverse-copy grinding'. This process eliminates the need for graphical determination of the master cam profile and simplifies the grinding considerably.

The machine is semi-automatic on operation. Functions such as job clamping, rapid advance of slide, rough feed, fine feed, spark off and rapid return of slide are fully automatic, the cycle time for grinding full cam profile (1.1 mm rise) from round blank takes 90 seconds.

The grinding wheel spindle runs on high precision three lobed, clearanceless, hydrodynamic bearings. High material removal rates have been possible with minimum spark off time because of the stiff wheel spindle system. The wheel spindle is made to axially oscillate for better finish on the job and reduced wheel wear. While dressing, the axial oscillations are arrested to prevent diamond fracture.

The heavily ribbed base structure of the machine is fabricated from steel plates and is thermally stress-relieved. Unlike the conventional grinding machines, the wheel head is fixed to the structure while the work-head is fed on to the grinding wheel. The dresser which is pneumohydraulically actuated, is housed on the workhead. This configuration eliminates the need for resetting to compensate for wheel size reduction after dressing.

The work spindle nose can accommodate different work holding mandrels for grinding different cams. The work spindle and hinge spindle run on preloaded antifriction bearings. Since the work head feed is cam controlled, very close repetitive accuracy has been possible. The feed cam has multiple profiles to have rough feed, fine feed and spark off. The cam also controls the two speed work spindle, drive motor to run at higher speed while roughing and slower speed while finishing. The functions such as rapid advance and return of workhead, job declamping, stopping wheel oscillation while dressing are controlled pneumatically.

Main Specifications (All dimensions in millimeters)

| | |
|---|---|
| Cam throw Max | 1.1 |
| Wheel drive | 5.5 KW |
| Wheel size | 500 x 19 x 350 |
| Wheel speed | m/sec 45 |
| Work speed RPM | 30/60 |

For manufacture under licence, please contact Central Machine Tool Institute, Bangalore.

## Slant Bed Copying Lathe

The ideal way of manufacturing profile shafts, railway axles etc., in large numbers is by using copying lathes. Heavy duty copying lathes are hitherto not being manufactured in India and the requirement is primarily met through imports. There is also considerable demand for such heavy duty copying lathes in the international market.

These considerations led to development of a new family of heavy duty lathes by HMT, Kalamassery. The design was based on the latest requirements of turning machines in the latest national/international market. This family of lathes are called the Slant Bed Lathes mainly because unlike the conventional machines, the bed is slant. The main advantages that are claimed for this configuration are better loading facility in the absence of any projection in the front, easy disposal of chips which fall clear off thebed and maximum weight to rigidity ratio in the absence of any apertures in the bed.

This family consists of Slant bed copying lathe SBC-35, Heavy duty slant bed shell turning lathes SBC-35H, Axle turning lathes SBC-35L, Slant bed multitool lathe SBT-35 and Slant bed numerically controlled turning centre SB CNC 35. As the structure and the essential features of all these machines are common, these machines share some of the latest technologies essential for an internationally acceptable machine.

Structure of this family of machines is designed and checked with the aid of a computer for optimum weight to rigidity ratio. CMTI Engineers assisted HMT in carrying out this computer aided design. The latest concept of torque tube without any aperture and location of shear centre in the vicinity of the resultant cutting force direction to get maximum torsional rigidity are incorporated in the design. The drive is also computer optimised and the spindle is made short and stout and mounted on preloaded gamet bearing and for maximum rigidity. Tailstock is of heavy duty construction with builtin spindle bearing and hydraulic load relieving. Copying slides are liberally dimensioned with large cylinder bores and move on preloaded linear roller bearings for maximum rigidity and better response. The machine can be fitted with multiple slides and in different orientations. In-feed slides are also liberally designed to take heavy plunges. Provision is made to work the infeed slides on rectangular cycle. Programming the machine for a cycle is by setting dogs on the longitudinal tracks. A free standing powerpack with a variable discharge pump supplies the power for slides. Additional refrigeration unit is available to maintain oil temperatures well below 45°C.

To summarise, SB family of machines and SBC-35, in particular, belongs to the type of machines which need not be switched off for weeks together and can be in continuous production use.

Main Specifications

| | | |
|---|---|---|
| Swing over bed | mm | 610 |
| Max. turning dia | mm | 350 |
| Turning length | mm | 800/1250 |
| Spindle nose | | A1-6" |
| Spindle bore | mm | 53 |
| Main motor | Kw | 15-30 |

## FOOD AND ALLIED INDUSTRIES

### Amino Acid Process

A new process has been developed to produce amino acid, a material used for making seasonings, from the strained waste of mandarin oranges obtained in the production of juice.

The process was developed jointly by the Saga Prefectural Fruit Growers Cooperative and the Kyushu plant of Ajinomoto Co., Japan, a leading seasoning maker.

In the process developed, peelings and other orange waste are pressed and the remaining juice extracted from them. All impurities from the juice are then removed through centrifugation and the resulting juice heated again to produce a syrup of 70 degree density from which amino acid is made.

The cooperative built a new plant in Karatsu, Saga Prefecture, at a cost of Y 270 million and is producing amino acid from the orange waste obtained from an adjoining juice plant.

It is reported that 2,000 tons of syrup have been produced so far. The cooperative had been drying the waste and using it to make compound feed but this required a huge amount of fuel oil and power. On the other hand, production of syrup and ammonia acid is possible with less fuel and power.

### Defatted Coconut Gratings

Coconut is widely used in Indian culinary, mainly for its flavour and texture. It is used either in the form of gratings or as milk extract. The process developed by the Regional Research Laboratory, Trivandrum yields partially defatted coconut gratings which could be used in the common food preparations like curries, chutneys, sweets and savouries. The process also yields high quality coconut oil with low acid value and rancidity, that can be used in cooking and as hair oil or massage oil. The coconut shell obtained is readily marketable for charcoal preparation.

Defatted coconut grantings are not marketed at present. Only desiccated coconut is available, nearly 2000 tonnes of which are used in confectionery. Partially defatted coconut grating being cheaper is likely to have good demand. The edible oil obtained as a byproduct has a ready market. The defatted coconut grating is estimated to cost about ₨ 5.50 per kg against the price of 12.00 per kg. for desiccated coconuts.

Fully matured dehusked coconuts are broken into two and the water is drained off. The cups are crushed in a hand crusher to break them into pieces, when most of the shell gets detached. The shells and kernels are separated manually. The kernels are then fed to a disintegrator (hammer or pin-type) for grating. The gratings are dried in the conventional driers to reduce the moisture content to about 3%. The dried gratings are subjected to hydraulic pressing to extract the oil. The defatted gratings are finally packed.

The partially defatted coconut grating can be made into ready-mix chutney powder incorporating other ingredients. Fresh, fully matured coconut is the only raw material and it is abundantly available indigenously.

Equipments required are: Disintegrator (hammer type, fitted with sieves, motor, etc., and hammer of 6 in length and 1 in diameter), drier (indirect drier with 7 shelves), hydraulic press (25 tonnes with steel cage of 50 cm). All the items are available indigenously.

Pre-design cost data (basis: processing of 6 lakh coconuts per year)

| | |
|---|---|
| Land and Building | ₨ 0.66 lakh |
| Plant and Machinery | ₨ 1.14 lakh |
| Working Capital | ₨ 0.78 lakh |

## Egg Albumen Flakes

The egg albumen flakes have crystalline appearance and are yellowish in colour. The technical grade flakes are used in offset printing, as adhesive in crown-cork cap manufacture and in leather tanning. The food grade product is used principally in bakery and confectionery industry. According to the import statistics, egg albumen had been imported to the extent of 16 tonnes during 1975-76. However, once it is available indigenously, the demand for this material is expected to grow.

With a view to substitute the imports of albumen flakes, Central Food Technological Research Institute, Mysore has developed a process for production of egg albumen flakes.

The egg consists of 10% shell, 30% yolk and 60% egg white by weight. Of the egg white, nearly 88% is water and 12% egg solids.

Eggs are broken, manually or mechanically and the white and yolk are collected separately. Yolk can be preserved by freezing. The egg white is fermented to remove glucose from the liquid mass. Fermentation is carried out by adjusting pH and adding suitable type of bacterial culture in requisite quantity. The fermentation becomes complete in 3 to 4 days. The material is strained to remove the sediment which accumulates at the bottom as well as the gelatinous mass formed on top. The clear thin liquid thus obtained is poured into aluminium pans and dried in a tray drier or a tunnel drier. The drying is carried out in two stages: initial drying at higher temperature to remove major portion of the moisture; final drying at lower temperature to bring down the moisture content. The total drying time is about 72 hours. By this process, about 13.5 kg. of albumen flakes are recovered from 100 kg. of egg white. The dried product which is fairly stable at room temperature is found to reconstitute very well. It is packed in tins or any other suitable containers.

Pilot plant investigation was also carried out at the institute. Samples of the product obtained were supplied to Government of India Press, New Delhi and to Indian National Scientific Documentation Céntre, New Delhi for testing in their photo off-set printing operations. The reports received from these organisations were favourable.

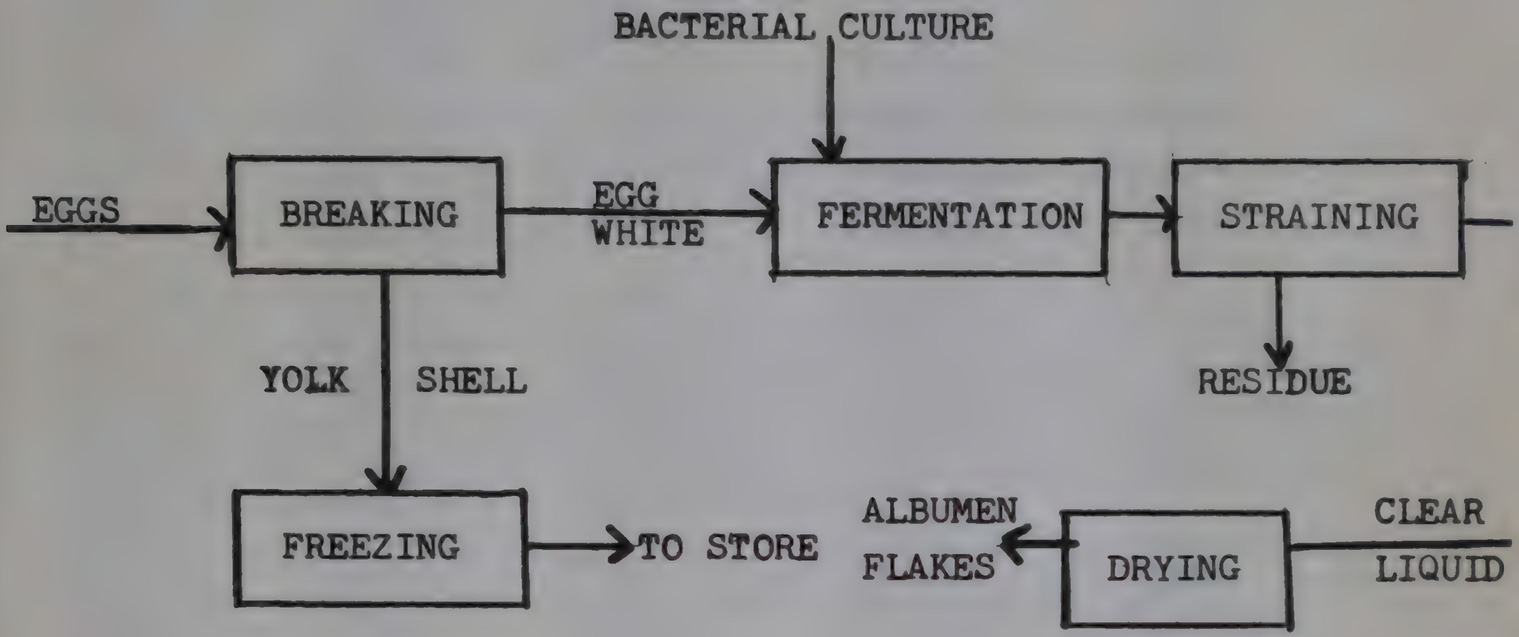
Eggs, bacterial culture, etc., are the main raw materials. These are available indigenously.

The following items of equipment are required for the process: egg breaking unit, fermentation vats (wooden or metallic), tray drier or tunnel drier, handling equipment, strainers etc. All these are available indigenously.

The capital investment for putting up a plant to manufacture 10 kg. of egg albumen flakes per day has been estimated at ₨ 0.15 million.

The plant needs about 7 persons for operation. The process has been licensed to 3 parties, who are in various stages of implementation.

BLOCK FLOW DIAGRAM FOR EGG ALBUMEN FLAKES
(Technical Grade)



## Hard Fat from Castor Oil

Hard fat made from castor oil is a new product to the Indian market. The tallow-like fat can successfully replace imported mutton tallow, which finds use in the soap industry, fatty acid manufacture, textile sizing, etc.

About 30-40 thousand tonnes of hard fat are needed by the above industries. Almost the entire quantity is imported as mutton tallow, except for some substandard products made in the country. The future demand is estimated at about 1.2 lakh tonnes. The present market price is assumed at about ₨ 7000 per tonne. On the other hand, castor oil is the cheapest vegetable oil available in commercial quantities, a part of which can be advantageously diverted for the manufacture of hard fat.

The process developed at the Regional Research Laboratory, Hyderabad involves just one-step operation of simultaneous catalytic dehydration and hydrogenation of castor oil. The product obtained has the desired quality of low hydroxyl and iodine values. The process is very flexible and enables products of varied specifications as desired for their end uses to be obtained.

Main raw materials are castor oil (ISI grade), catalyst (commercially available) and hydrogen. All items are available indigenously.

The general equipment of a hydrogenation (vanaspati) industry, with the addition of a recirculation system for hydrogen is required.

Predesign cost data (basis 9000 tonnes/year)

| | |
|---|---|
| Land and Building | ₨ 0.40 lakh |
| Plant and Machinery | ₨ 33.75 lakh |
| Working Capital | ₨ 53.61 lakh |
| Cost of Production | ₨ 6100/tonne |

Developmental work on 15 kg/batch scale was done in the laboratory and process conditions for getting products with the desired specifications (hydroxyl and iodine values) were established. Samples sent to three parties met their requirements. The process is covered by an Indian patent application.

## PULP, PAPER AND PAPER PRODUCTS

Anti-Corrosion Packaging paper for which the Central Electrochemical Research Institute, Karaikudi (CECRI) has developed a technology is used for prevention of corrosion of various types of ferrous engineering items such as machine tools, hardwares, machine parts, automobile parts etc., during transit and storage.

The process envisages dissolution of the inhibitive chemicals either in water or in a suitable solvent. Solution is then coated on to kraft paper and wound into rolls. The machine for coating developed by CECRI is suited for commercial scale plant. The main equipment required is the coating machine inclusive of drive motor.

Capital investment for a plant of capacity 1200 sq. metres of coated paper from aqueous bath or 2400 sq. metres of coated paper from non-aqueous bath per day of one shift is estimated to be ₨ 4.25 lakhs including working capital. Cost of production has been worked out to be ₨ 1.44 per sq. metre.

### Paper from Agricultural Wastes

With the increasing need for all types of paper, it has become necessary to explore and use new sources of raw materials, both cheap and abundant such as mesta, bagasse, jute sticks and straw from wheat and paddy. The utilisation of these agricultural waste materials is becoming increasingly important.

The conventional methods for production of paper from these agricultural wastes have low yields (40-45%) and do not make an attractive venture. A completely new process known as the 'hot caustic soda process' has been developed by the Forest Research Institute (FRI), Dehradun. The yield of pulp with this process ranges between 60 to 65%.

The consumption of chemicals such as caustic soda is substantially lower, with the result that highly economic production is now possible even in small plant.

The pulp made by this process can be used for manufacture of newsprint, wrapping paper, writing and printing paper.

The new process provides a quick, simple, practical and economical method of obtaining high yield pulp. It is a two stage process. In the first stage, the raw materials in the form of chips are cooked with caustic soda solution for a short period. The quantity of caustic soda is varied depending upon the raw materials used and the grade of pulp desired. After caustic treatment, the spent liquor is withdrawn and the treated chips are washed with water. In the second stage of the process, the treated chips which are now washed sufficiently soft, are mechanically fiberised into pulp.

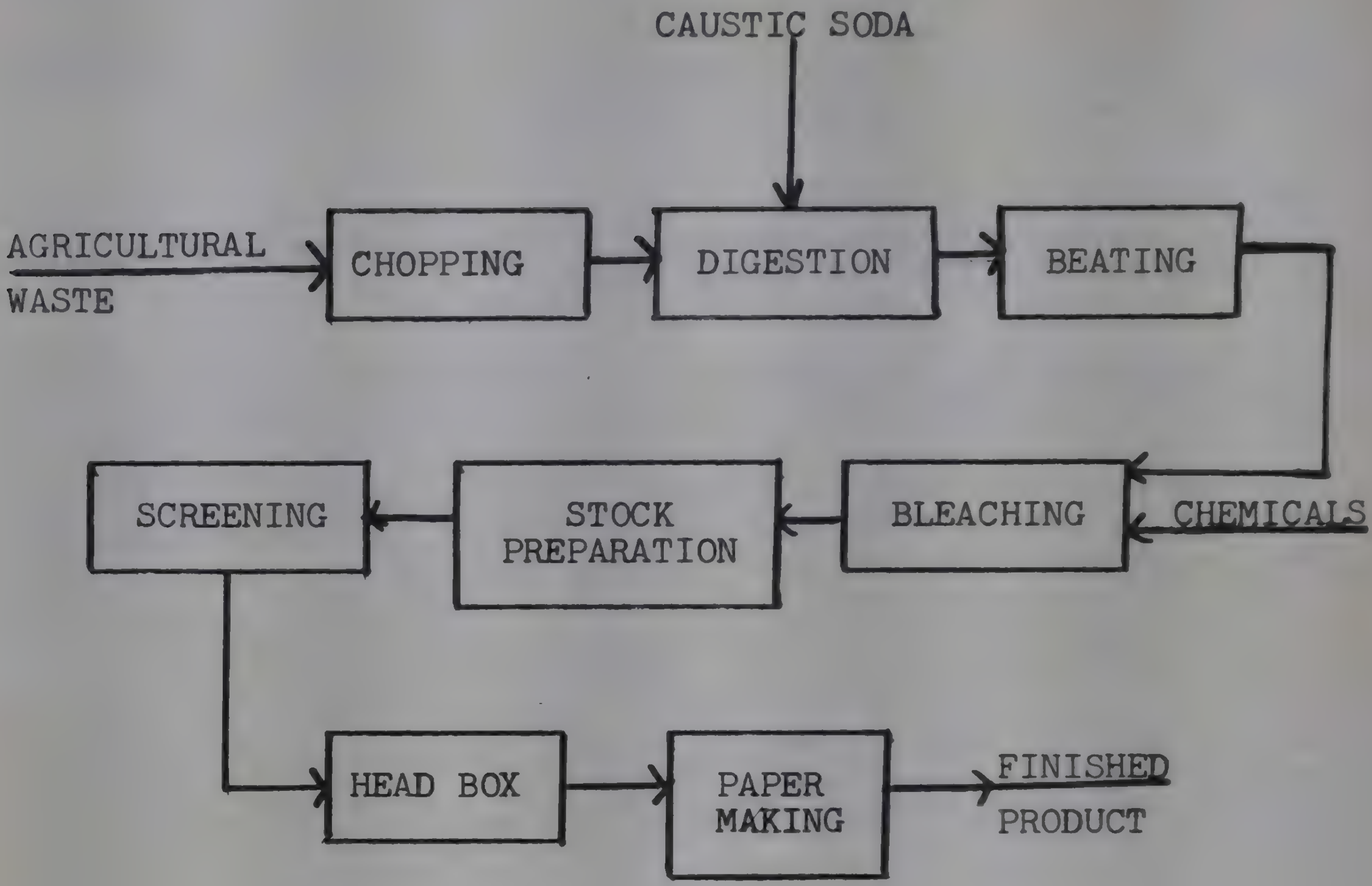
The refined pulp is then washed with water, screened, bleached, beaten and made into paper on conventional paper making machine. The process has been carried out on a pilot plant having a capacity of 6 tonnes per day.

Agricultural wastes, caustic soda, chlorine, sodium sulphate, rosin and fillers are the main raw materials required in the process. All these are available in the country.

The major items of equipment required includes chopper digester, beaters, bleaching tanks, mixing tanks, wire screen paper machine. All are available in the country.

It is estimated that a plant having a capacity of 10 tonne per day would cost ₨ 15 million. About 150 persons are needed to operate a plant of above capacity.

BLOCK FLOW DIAGRAM FOR PAPER FROM AGRICULTURAL WASTES


CAUSTIC SODA
AGRICULTURAL WASTE
CHOPPING
DIGESTION
BEATING
BLEACHING
CHEMICALS
STOCK PREPARATION
SCREENING
HEAD BOX
PAPER MAKING
FINISHED PRODUCT

Speciality Papers

Speciality papers covered by the process are filter papers and other types of papers such as drawing, ashfahan (fancy paper) bond, cover album etc. Filter paper and filter pads find use in chemical and pharmaceutical industry. The other types of speciality papers have good demand in urban areas.

To render the process amenable for small scale sector, a small plant having a capacity of 270 kg. of speciality paper per day has been arrived at. To achieve higher efficiency at lower capital investment, manually operated paper lifting vats have been specially designed.

The process developed by Regional Research Laboratory, Hyderabad, consists in digesting the sorted, dusted and cut rags in a digester with alkali, washing it free of alkali after digestion and reducing it to half stuff in a beater. The half stuff is bleached in wooden or cement vat and then beaten to pulp; required amounts of colour, sizing chemicals and loading materials are added in the beater. The resulting pulp is diluted and passed through strainer. It is then lifted into paper sheets which are couched, pressed, peeled dried and surface sized. After maturing the sheets are calendered, sorted out and packed. The requirements of utilities and raw materials for a plant having the above mentioned capacity are given below:

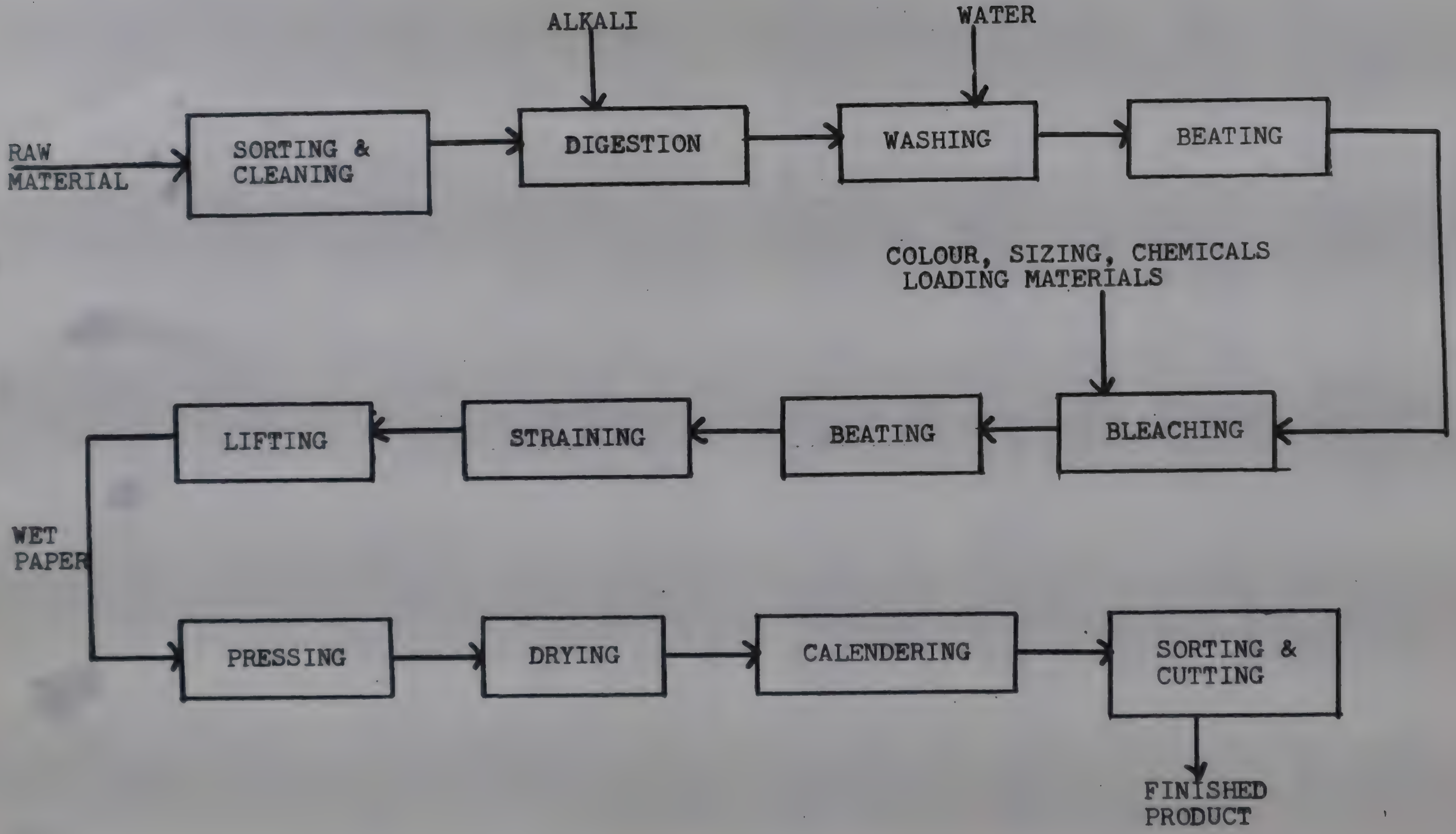
| | | |
|---|---|---|
| i) Raw material | cotton/rags/ cotton linters | 8 tonnes per month |
| ii) Water | 250 kilo litres | per day |
| iii) Power | Connected-load<br>consumption | 100 HP<br>500 KWH/day |

The work on the process has been carried out in the laboratory on a scale of 50 kg. paper per batch.

The main raw materials required are rags, linters and chemicals. All these are available indigenously. Rag cutter, digester, beater, centricleaners, paper lifting vats, hydraulic press, calendering machine, paper cutter, weighing machine, pumps, hot air blower are the main items of equipment required for the process. All these are available indigenously.

The investment required for a unit having a capacity of 270 kg. of paper per day of 2 shifts is estimated at ₨ 0.65 million. 100 persons could be employed for operating this plant. This process has been licensed to three parties, out of which one party is in production.

## BLOCK FLOW DIAGRAM FOR SPECIALITY PAPER


RAW MATERIAL
SORTING & CLEANING
ALKALI
DIGESTION
WATER
WASHING
BEATING
COLOUR, SIZING, CHEMICALS LOADING MATERIALS
BLEACHING
BEATING
STRAINING
LIFTING
WET PAPER
PRESSING
DRYING
CALENDERING
SORTING & CUTTING
FINISHED PRODUCT

# New Machinery and Equipment

## ELECTRONICS AND ELECTRICAL EQUIPMENT

### Compact Lamp

PHILIPS, Holland, has developed and marketed in Europe a new lamp, called the 'SL' lamp; it gives as much and as good an illumination as a normal lamp of comparable light output. The principle of the 'SL' lamp is that of a gas discharge in a low pressure mercury vapour resulting in the release of ultraviolet radiation.

As in the case of a tube lamp, the radiation is converted into visible light by means of fluorescent powder. The new lamp has a rated life of 5,000 hours which is five times longer than an ordinary bulb and consumes very low energy.

A notable feature is that miniaturisation has made it possible to accommodate the starter and the ballast in the lamp base. Again, the 'SL' lamp can replace an ordinary bulb in the existing holder straightaway since it is available in bayonet cap type in addition to screw cap type.

The 'SL' lamp has already proved its worth in the industrial and commercial sectors in Europe where economy is calculated in terms of initial costs, running costs and total saving on energy. In the domestic sector, a large market is as yet not envisaged, but Philips hopes that before long it will be able to bring in a wide range to cater to various users.

For further details please contact: Peico Electronics & Electricals Ltd., Shivasagar Estate, 'A', Dr. A.B. Road, Worli, Bombay 400 018.

### Economical Totalizer

ITT Barton has developed a new flow rate/totalization instrument as a mate for the company's line of 8000 series turbine meters. The newly introduced units can also supply readout and totalization functions for the company's positive displacement meters when the P.D. meters are equipped with a pulse transmitter.

Designed for panel and field use, the new Barton Model 8070 totalizers are available in standard or weatherproof configuration. Base model offers a direct reading 6 digit totalization counter. Two additional options include a counter to 8 digits and a flow rate indicator. Count rate measures up to 1200 per minute. The 8070 features all solid state electronic with screw river-type field connections. The unit operates on 220 V AC, 50/60 Hz and provides power output to the preamplifier of the turbine meter. Input frequency accommodates 5 Hz to 4200 Hz with peak to peak range of from 35 mv to 5 volts.

Additional product advantages include protected controls that prevent casual improper adjustment and built-in oscillator test circuit. An on-off power switch is illuminated for easy reference. Remote totalization is made possible by means of a relay output option. Contact time is 15 milliseconds. Barton Instruments is a unit of International Telephone and Telegraph Corporation of the USA.

The Barton 8070 is available against actual users import licence. For further information write to: Jost's Engineering Company Limited, Great Social Building, Sir Phirozeshah Mehta Road, Bombay 400 001.

## New Multipurpose Insulation & Continuity Tester

Evershed and Vignoles Ltd., are pleased to announce the introduction of a new product in the Megger range: the BM10 Battery Megger Insulation tester. This instrument is the latest addition to a comprehensive range of Megger testers which has grown with the experience of over 75 years in the electrical testing field.

The BM10 has been designed to fill most of the requirements for insulation testing up to 1000 volts and continuity testing. It is a truly multi-purpose tester that is very easy to use. Insulation resistance tests may be made at five test voltages from 50 V to 1000 V d.c. The instrument is suitable for the maintenance of electrical systems, cables, switchgear, motors and generators having high values of insulation resistance and requiring insulation tests at voltages upto 1 kv. Insulation tests may also be performed at low voltage, thus not endangering components liable to damage at higher test voltages. The integrity of earth conductors, or ring main continuity, can be checked using the continuity range. Facilities are also provided for the checking of voltage upto 500 volts, both a.c. and d.c.

The BM10 incorporates important safety features to ensure the safety of the operator and to prevent damage to the instrument itself or the circuit under test. The first of these features is the safety voltage range. The instrument acts as an ac/dc voltmeter on any switch position before the test button is pressed. This means that the meter will immediately indicate to the operator if the circuit is not isolated when the test leads are connected. The second feature is an interlock in the form of a sliding button that must be operated before the 1000 volts range can be selected. This will prevent the inadvertent selection of 1000 volts which could cause damage to low voltage circuits.

When insulation testing on a capacitive load, such as a long supply cable, the BM10 is capable of delivering a relatively high charging current, thus reducing the time required to change the capacitance. After reading the insulation resistance, the capacitance is automatically discharged through a low internal resistance when the test button is released, and the BM10 voltmeter visually displays the decay. This is another important operator safety feature.

The meter scale is clear and uncluttered, with an antiparallax mirror. The standard range on the insulation resistance ranges is 10 kilohms to 1000 Gigohms, and the accuracy is 2% of the 127 mm scale length. The ac/dc voltage range is upto 500 volts, to an accuracy of 2.5% of scale length.

Power for the tester is provided by four standard dry cells. These can, if required, be replaced by standard rechargeable cells. A socket on the side of theinstrument has been provided to change these cells if fitted, and battery chargers, operating from standard mains voltages, are available.

The BM10 is housed in a robust and attractive moulded ABS case, with a built-in carrying handle and a clip on protective cover. A specially designed test-and carry case is available for added protection. This can be used around the neck and holds the tester firmly in horizontal operating position.

The BM10 and its accessories are available against actual users import licence.

For further information write to: Jost's Engineering Comapny Limited, Great Social Building, Sir Phirozeshah Mehta Road, Bombay 400 001.

## ENGINEERING EQUIPMENT

### Drum Handling Equipment

Fibro has developed a range of 'Bahubali' drum handling equipment, one of them is 'Bahubali' Drum Jockey, which is a multifunction drum/barrel handling device - operated by a single person for varied purposes such as lifting, shifting, stacking, dumping, and pouring contents of a barrel conveniently at a height upto 2 metres. Gradual 'tilt' mechanism enables easy pouring and dumping of materials with controlled flow as per requirements. 'Bahubali' drum jockey is specially designed for stacking the barrels at desired heights and for loading barrels into trucks, and unloading barrels from trucks

'Bahubali' drum jockey is suitable for all standard 205 litres barrels and is fabricated out of sturdy steel structure under stringent quality control measures. The frame is mounted on solid rubber castors with bearings ensuring smooth and easy movements. Ideally suited for direct pouring/charging of barrels containing hot, toxic or poisonous materials into hoppers, mixers, vessels, furnaces, etc., 'Bahubali Drum Jockey' has very wide applications in modern factories, workshops, warehouses, maintenance shops, etc.

For details contact: Fibro Industrial Trading Company, Kurla-Andheri Road, Saki Naka, Bombay 400 072.

## Maxtra Tea Fibre Extractor

Maxtra Tea Fibre Extractor is designed on the principle of static electricity. PVC rollers are arranged in single row running at slow speed, and can be recharged with electric lighting arrangements; it has single crank arrangement feeding hopper fitted with ball separator with geared mechanism to control the feed.

A slight turbulence is imparted to tea travelling on the Dimple Tray, to expose the concealed fibres. The fibre is turned over by centrifugal action and collected in a collection box over the tray and subsequently transferred into a receptacle.

Maxtra is provided with a mechanism to adjust the PVC rollers from one side, to overcome the difficulties of maintaining the gap between roller and dimple tray; it also ensures precise adjustments without the use of any tools.

Maxtra is driven by 2 HP x 1440 Rpm, 3 phase 50 c/s electric motor.

### Model-427

It is 27" wide with 4 rollers. The first two rollers are of 12 inch dia. The rollers have a variable speed of 12 & 20 rpm to get different grades of the material.

### Model-540

It is 40" wide with 5 rollers. First two rollers are of 12 inch dia and the balance 3 of 8 inch dia. The rollers have a variable speed of 10, 12, 16 & 20 rpm to get different grades of the material.

## Grading

Maxtra along with the extraction of fibre from the tea also grades it, making final sorting more easier.

Other Features: High Capacity; Low maintenance cost; Competitive price; Better processing without affecting the bloom; Permanent or electromagnets can be provided at extra-cost; Jigger action on the hopper can be provided in place of middleton action for the extraction of balls from tea.

For details contact: Aluminium Industries (Assam) Private Ltd., Makum Road, Tinsukia, Assam.

## New Hi-Vac Hose

Anaconda Metal Hose announces immediate availability of its new Hi-Vac hoses for use with high vacuum refrigeration service equipment. Constructed of high strength tinned bronze, Anaconda Hi-Vac hose, in conjunction with high vacuum pumps, will quickly evacuate systems down to the low micron ranges specified by refrigeration and air-conditioning manufacturers.

Anaconda Hi-Vac hoses, fabricated with a high strength tinned bronze alloy composed of 98-3/4% copper for extreme fatigue resistance and long life, are flexible and non-collapsing under high vacuum conditions. They will pull an almost total vacuum quickly and hold it indefinitely. The highstrength, all metal construction of the Anaconda Hi-Vac hose is a significant improvement over the rubber and synthetic rubber materials ordinarily used in refrigeration service becuase the Hi-Vac hose eliminates leakage of freon gas through the rubber casing.

Anaconda Hi-Vac hoses are available in SAE fitting sizes of 6.35 x 9.53 mm (1/4", 1/4" x 3/8") and lengths of .9144 and 1.2192 meters (36" and 48"). All sizes and lengths have quick coupling flared refrigeration fittings and a bronze braid covering for strength and flexibility. For a complimentary catalog, write to: Anaconda Metal Hose, Box 2618, Waterbury, CT 06720 USA.

## Plate Bending Machines

These heavy duty plate bending machines employ the orthodox roller pyramid principle. Bottom rolls are fixed/and are driven by a system of gears and worm reduction gear box whereas the top roll has a vertical up and down movement through (a) Screw adjusted manually (b) Separate motor and reduction gear box. The housings are steel fabricated with large bearing surface area. The rolls are of wear resistant forged steel and are amply dimensioned to keep deflection to the minimum. Screw jack is provided to keep the top roll horizontal when the formed shell is to be extracted. Horizontal grooves are provided throughout the length of rolls for additional gripping and correct feeding. Indicators are provided at both ends for correct top roll pressure.

Further details from: Technical Engineering Enterprises,
30, Apollo Street, Bombay 400 023.

Surface Grinder

The base is made of heavy duty, closed grain grey, cast iron with ample proportion to give a rigid foundation, so essential for precision grinding. The base houses the electrical control, gear main driving system of the work slide and coolant arrangement.

The grinding head is supported by a box type column, which gives rigidity and minimum deflection at the wheel head. The special type motor is provided with taper roller bearing.

The segmental grinding wheel is of the "Outside segment" type which in vertical spindle machines, has a distinct advantage in the setting & adjusting of the grinding segments. The segments are secured by bronze wedges on the outer periphery of the segmental wheel. A complete set of segments can be replaced or reset in a few minutes. Protection for segmental wheel is heavily organised.

The longitudinal work slide is well designed with one bearing surface as flat square type guideways and other is V shaped to attain the maximum efficiency and accuracy.

The guideways are lubricated with roller type internal reservoir system which needs minimum attention. The slides are fully protected with covers.

The controls are so arranged that the operator can handle the machine from all convenient angles to suit the types of jobs.

The surface grinder is useful in automobile workshops, machine & tool rooms.

Principal Dimension

| Sl. No. | Type | | Segmental No. 1 | Cup or Segment No. 2 |
|---|---|---|---|---|
| 1. | Segmental Wheel | Dia | 300 mm | 200 mm or 150 mm |
| 2. | Segmental Wheel | R.P.M. | 1440 | 2800 |
| 3. | Table Working Max | Surface | 1220 x 290 | 760 x 190 |
| 4. | Table to Wheel | Height Max | 600 | 300 |
| 5. | Table | Travel | 1100 | 760 |
| 6. | Grinding Capacity | | 900 x 280 | 450 x 140 |
| 7. | Table Speed | | 6',8', 12'/min | 6',8'/min |
| 8. | Vertical Microfeed Graduation | | .01 mm | .01 mm |
| 9. | Table with 2-T-Slots to take bolts | | 13 mm | 10 mm |
| 10. | Centre to (T) Bolts | | 145 mm | 63 mm |
| 11. | Floor Space required | | 3635 x 1100 | 2443 x 760 |
| 12. | Total Height | | 1200 mm | 1950 mm |
| 13. | Approximate Gross Weight | | 2400 kgs. | 1650 kgs. |
| 14. | Approx. Shipping Space Packed Cu.Ft. | | 141 | 115 |
| | Electrical Equipments | | | |
| | (a) Grinding Head Motor | | 7½ HP | 5 HP |
| | (b) Feeding for Main Slide | | 1½ HP | 1 HP |
| | (c) Coolant Pump | | 0.1 HP | - |
| | (d) Rapid for Ram | | 1 HP | |
| | Extra Equipments | | | |
| | (a) Magnet Check | | 755 x 250 | 350 x 150 |
| | (b) Head Motor HP Capacity | | or 10, 12½ or 15 HP | |

Note: Both the machines are also available hydraulic driven

For Details: Arvinder Engineering Works, G.T. Road, Dholewal,
Ludhiana 141 003.

## Tapping Machines

The Bench Tapping Machine Type M-10 is of simple and up-to-date construction and is designed for easy operation. The spindle is driven by a clutch unit via a V-belt drive. Feed is actuated by hand.

The Type M-10 comprises the following main parts: Head with belt tensioning device and base with column and table. The spindle rotation in both directions is by friction clutch which is designed for the withdrawal of the tap at higher speeds in the reverse direction. The clutch mechanism lends the machine the necessary sensibility to reverse directions automatically at the exact moment the tapping depth is reached. This is effected with extreme smoothness, thus reducing the possibility of tap breakages to the absolute minimum.

The machine is equipped with an electric switch for starting the machine and for changing the direction of rotation for right hand and left hand tapping.

The table can be lifted, lowered and swivelled by hand and clamped to the main column by handle.

The tapping depth can be adjusted by the adjusting screw provided at the operating lever.

### Specifications

| | |
|---|---|
| Capacity | 3/8" |
| Forward speeds | 275/470/780 r.p.m. |
| Reverse speeds | 370/650/1060 r.p.m. |
| Rise and fall of spindle | 1¾" |
| Spindle external taper | JT-6 |
| Spindle centre to column | 5½" |
| Maximum distance, chuck to table | 15" |
| Table size | 9½ x 8" |
| Table working size | 7½" x 6" |
| Motor | 1/2 h.p. 960 r.p.m. 3 ph. |
| Distance between chuck to base | 18" |

### Standard Accessories

| | |
|---|---|
| 1 chuck | All fitted to the machine |
| 1 V-belt for motor | |
| 1 V-belt for clutch | |

1 driving motor 1/2 h.p. 960 r.p.m. 3 ph.

1 switch for right hand and left hand threads.

## Model M-19

Remit Tapping Machine Type M-19 is one machine that does the job of two, helping to cut down labour costs and to reduce tool costs. The change-over from drilling to tapping or from tapping to drilling is effected by the flick of a switch.

### Built-in Features

Precision quality and workmanship

Simple, effortless handling and high output

Exact location of depth

Designed for both right hand and left hand tapping

Additional foot pedal control to reverse spindle at will

Gears running in totally enclosed oil bath

Eight spindle speeds - 55 to 1200 r.p.m.

Built with patented Remit Tapping Electric Controls

Tap breakage reduced to almost nil because once the tap had entered workpiece, the only force on the tap is rotary torque. Particularly advantageous in processing of lighter materials.

Changes reverse direction of spindle automatically back to normal.

### Capacity

| | |
|---|---|
| Tapping in steel | 5/8" diameter |
| In other metals | 3/4" diameter |
| Drilling in steel | 1" diameter |

### Specifications

| | |
|---|---|
| Spindle | Morse Taper No. 3 |
| Spindle speeds (8) | 55-90-140-225-300-480-750-1200 r.p.m. |
| Spindle travel | 4½" |
| Distance from spindle to table, max. | 24" |
| Distance from spindle to base, max. | 38" |
| Table working surface | 13" diameter |
| Table size | 16" diameter |

| | |
|---|---|
| Column | 4" diameter |
| Centre of spindle to column | 11½ |
| Driving motor | 1 h.p. 900 r.p.m. |
| Overall machine size | 77" x 31" x 24" |

Standard Equipment

Electric motor 1 h.p. 440 V 50 cy. 3 ph. A.C. 900 r.p.m.

Additional Equipment

Tap holder M.T. No. 3 Cap. Drill chuck ½" with M.T. Arbor. Motorised coolant pump unit with tank, pipe, fittings etc.

Further details from: Remit Manufacturing Co., Prabhadevi Industrial Estate, Veer Savarkar Marg, Bombay 400 025.

## METALLURGICAL EQUIPMENT

### Gas Lenses for TIG Torches

Advani-Oerlikon, the leading manufacturer of welding consumables and equipment, have introduced gas lenses for TIG tungsten inert gas welding torches. Use of these lenses helps to achieve considerable economy of expensive argon gas.

The lens is directly screwed onto the head of the standard TIG torches manufactured by the company resulting in a smooth and lamellar gas flow.

These lenses are suitable for TIG torch models BTG-20-8 and BTW-40-8 manufactured by the Company and are available in the following types to suit tungsten electrode size as follows:

| Gas Lens type | Electrode diameter |
|---|---|
| 89-61-25 | 1.0 |
| 89-61-26 | 1.6 |
| 89-61-27 | 2.0 |
| 89-61-28 | 2.4 |
| 89-61-30 | 3.2 |

Further enquiries to: M/s. Advani-Oerlikon Limited, P.O. Box 1546, Bombay 400 023.

## Strip Cladding Head

Advani-Oerlikon's Welding Research Centre at Chinchwad, Poona, has now developed a strip cladding head using submerged arc welding process. According to studies conducted by the Company, this head can find a variety of application in the fabrication industry.

Strip cladding is used to deposit an expensive alloy on the surface of a relatively cheaper metal enabling considerable savings in expensive metal consumption.

The strip cladding head can take stainless steel strips of upto 60 mm width and 0.5 mm thickness carrying welding currents upto 1000 amps, DC at 100% duty cycle.

Model SF-1 can be supplied in two versions - as a trolley mounted unit to travel on a fabricated rail track, or as a static unit suitable for mounting on a welding boom.

Stainless steel flux grade-I developed at the Company's R & D Centre at Bhandup is ideal for stainless steel cladding operation.

For further details, write to: Advani-Oerlikon Limited,
P.O. Box 1546, Bomaby 400 023.

## Welding Transformers

Advani-Oerlikon Limited have recently brought out a new series of welding transformers called ADOR range. These are based on a novel design concept developed by the R & D Centre after considerable thought and effort. These are lowcost, light-duty and low-current welding transformers which will satisfy the long-felt need of the small scale industry, auto garages, wayside fabricators and the mechanised farms for an economical low unit consuming welding power source. These middle-class technocrats had hitherto to depend on the conventional heavy duty transformers with maximum current capacity of 200 amps. and above, whose no lead power consumption and current consumption while welding are prohibitively high. Even compared to the lower capacity transformers designed for 220 volts supply which are sometimes available in the market, the ADOR machines are 25% lighter in weight, provide a fairly high open circuit voltage of 50, and give top performance with good arc striking and stable arc.

The unique features of the "ADOR" range are firstly, that the user has a choice of three models with maximum current capacities of 12A, 150A, and 190 A respectively depending on whether the maximum size of electrode used is 3 mm, 4 mm or

5 mm; secondly they provide stepless current regulation. This is the first time in India that this latter feature is obtainable in a small capacity transformer. It enables the user to set the right current according to the size and type of electrode and to correct the current if fluctuations occur in the line voltage. All of them are designed for 230 volts single phase input.

"ADOR" welding transformers are rated for only 20% duty cycle, taking into consideration the intermittent welding operations normally performed by the small fabricator in minor repair welding and in the production of grills, gates, steel windows steel furniture etc. They are not meant to be used for continuous production work where duty cycles are higher. The overloading is prevented by the fuses whose input ratings for the three models are 13A, 15A and 20A respectively. Many other safety features are also incorporated.

# Industry Roundup

This section highlights policies and procedures, guidelines, the present status and future prospects in certain industries as well as the latest available data in respect of such industries.

## GRINDING WHEEL INDUSTRY

Grinding Wheels are very sophisticated products and the advanced countries are highly brand and quality conscious. Grinding wheels are made up of grinding material, namely, silicon carbide and aluminium oxide with bonding agents like resin, rubber, bakelite, clay etc. These are mainly used for metal removing to obtain close tolerances and fine finish of the product.

The major users of grinding wheels are: (1) machine tool industry; (2) heavy engineering industry; (3) automobiles industry; (4) alloy steel plants; (5) heavy electricals and ball bearings industries etc.

In this section, current situations and future scope of industries manufacturing grinding wheels of the types viz., diamond impregnated, natural stone, synthetic abrasives, other grinding wheels etc., are discussed.

Present Situation: The total capacity covered by licence or registration is 12,885 tonnes. Letters of intent have been issued for an additional capacity of 5,040 tonnes.

There are, at present nine units manufacturing grinding wheels with an installed capacity of 8,595 tonnes per annum. The production and installed capacity of grinding wheels during the period 1974-1979 were as given below:

Table (1) Production        Table (2) Installed Capacity

### Table 1: GRINDING WHEEL PRODUCTION

| Year | No. of units | Production | |
|---|---|---|---|
| | | Qty.(Tonnes) | Value (₨ lakhs) |
| 1974 | 6 | 6824 | 752 |
| 1975 | 6 | 6331 | 854 |
| 1976 | 6 | 6745 | 979 |
| 1977 | 7 | 7001 | 1220.7 |
| 1978 | 9 | 6575 | 1055.20 |
| 1979 (April-December) | 9 | 6596 | N.A |

### Table 2: GRINDING WHEEL INSTALLED CAPACITY

| Year | No. of units | Installed capacity (Tonnes) | Licensed/Regd. capacity (Tonnes) |
|---|---|---|---|
| 1972 | 5 | 6,120 | - |
| 1973 | 6 | 7,000 | 7,645 |
| 1974 | 6 | 7,000 | 8,548 |
| 1975 | 6 | 8,545 | - |
| 1976 | 7 | 8,545 | - |
| 1977 | 9 | 8,645 | - |
| 1978 | 9 | 8,645 | - |
| 1979 | 9 | 8,645 | 13,278 |

It is clear from the above table (1), the production is steadily increased from ₨ 752 lakhs in 1974 to ₨ 1220.70 lakhs in 1977 and fell by 22 per cent to ₨ 1055.20 lakhs in 1978. The reason was due to non-availability of raw materials, power cut and high ruling material costs. This industry had faced shortages of raw materials in the past. The shortage of resin was rather severe due to acute scarcity of phenol. But, the production for the months April to December 1979 was increased, from the position 6575 tonnes in 1978 to 6596 tonnes in 1979 April to December. The prospects of grinding wheel production for the period 1984-85 is very much linked with the growth pattern visualised in the sixth five year plan. There are: rubber bonded grinding wheels, bakelite bonded wheels and specialised grinding wheels which are required for the razor blade industry. Units which want to specialise in certain types of grinding wheels, such as, rubber bonded grinding wheel can go in for capacities as small as 100 to 150 tonnes per annum.

## Imports

The imports of grinding wheels viz. diamond impregnated, natural stone, synthetic abrasive and other grinding wheels are given below:

Table 3: IMPORTS OF GRINDING WHEELS

| Year | Grinding Wheels (All 4 types) | |
|---|---|---|
| | Qty. (Tonnes) | Value in ₨ lakhs |
| 1972-73 | 199.883 | 29.62538 |
| 1973-74 | 389.756 | 12.50078 |
| 1974-75 | 168.983 | 28.92702 |
| 1975-76 | 143.097 | 49.32021 |
| 1976-77 | 96.904 | 29.13313 |
| 1977-78 | 187.325 | 99.43189 |

The imports of grinding wheels raised to ₨ 99.43 lakhs in 1977-78 from ₨ 12.50 lakhs in 1973-74 and fell by ₨ 29.13 lakhs in 1976-77. This increased and decreased rate of importation was due to the sudden spurt in production activities of engineering industries particularly during the period 1975-76 and 1977-78. The reason for the fall of imports of grinding wheels was mainly due to the government restrictions on certain types which are required by specialised engineering industry like ball bearing and razor blades industries, and also for super finishing stones and hones, etc. The annexure (1) gives import figures on individual wheel-wise for the period 1972-73 to 1977-78. These imports are basically originated from countries viz. German, Switzerland, UK, USA, Austria, Czechoslovakia, Malaysia, Sweden, Denmark, France, Italy and Japan etc.

## Exports

The exports of the industry were very little before the fourth plan. The exports during 1972-73 were of the order of 331.75 tonnes to the value of ₨ 10.4634 lakhs and increased in 1977-78 to the order of 1097.663 tonnes worth of ₨ 45.60 lakhs. The growth of exports in the Fifth Plan was, rather marginal. The export figures for the period 1972-73 to 1977-78 was as under.

Table 4: EXPORTS OF GRINDING WHEELS

| Year | Grinding Wheels (All 4 types) | |
|---|---|---|
| | Qty. (Tonnes) | Value in ₨ lakhs |
| 1972-73 | 331.715 | 10.4634 |
| 1973-74 | 178.856 | 90.83657 |
| 1974-75 | 848.662 | 52.94122 |
| 1975-76 | 551.690 | 33.70777 |
| 1976-77 | 628.662 | 51.05344 |
| 1977-78 | 109.7663 | 45.60240 |

The exports figures on individual items viz. diamond impregnated, natural stone, synthetic abrasive, other grinding wheels etc., are included in annexure (2). The major countries to which these items were exported are: Canada, Czechoslovakia, Bangladesh, Turkey, UK, USA, Srilanka, Iran, Iraq, Japan, Kenya, Malaysia, Singapore, Tanzania, Thailand, Uganda, Nepal, Kuwait, Hong Kong etc.

## Future scope

Grinding wheel industry's fortunes are linked with the steel consumption by the engineering industry. There is no clear information on the consumption of steel by 1979-80 but the prospects of steel production can be used as a basis to calculate the requirements of grinding wheels by the engineering industry. The demand projection of mild steel during 1979-80 was 7.40 million tonnes against 7.20 million tonnes in 1977-78 According to the Fifth and Sixth Five Year Plans the projected steel production was 10.90 million tonnes and 15.40 million tonnes in 1982-83 and 1987-88, respectively, whereas the steel production targets for 1984-85 is 11.7 million tonnes according to Sixth Five Year Plan. The details of steel production projections are as follows:

Table 5: STEEL PRODUCTION PROJECTIONS

| Year | Steel Projections (Quantity in million Tonnes) |
|---|---|
| 1977-78 | 7.20 |
| 1979-80 | 7.40 (Fifth Five Year Plan) |
| 1980-81 | - |
| 1982-83 | 10.90 |
| 1984-85 | 11.70 (Sixth Five Year Plan) |
| 1987-88 | 15.40 (Sixth Five Year Plan) |

## Demand Projection

The demand can be calculated for grinding wheels on the basis that one million tonnes of steel consumption requires thousand tonnes (1000 tonnes) of grinding wheels, or the future requirement of grinding wheels may be arrived taking into account of total production target and projections of steel in the five year plans. The future production projections are given in Table (5). Therefore the requirement of grinding wheels is as below:

Table 6: REQUIREMENT OF GRINDING WHEELS

| Year | Steel Projection (Million Tonnes) | Grinding Wheels Requirements | |
|---|---|---|---|
| | | Million Tonnes of steel consumption requires 1000 tonnes of Grinding Wheels (tonnes) | As per Ministry's Calculation (Tonnes) |
| 1977-78 | 7.20 | 7,200 | 16,000 |
| 1979-80 | 7.40 | 7,400 | - |
| 1982-83 | 10.90 | 10,900 | - |
| 1984-85 | 11.70 | 11,700 | - |
| 1987-88 | 15.40 | 15,400 | - |

The demand for grinding wheels in 1982-83 would be in the order of 10,900 tonnes against 7,200 tonnes in 1977-78. The requirement for 1984-85 and 1987-88 would be in the order of 11,700 tonnes and 15,400 tonnes of grinding wheels. Grinding wheel manufacturers may contend that the requirement of 16,000 tonnes in 1980-81 assessed by the ministry is an over estimate. The question is whether the steel consumption by the engineering industry would be of the order of 11.70 million tonnes and 15.40 million tonnes on par with steel production targets for 1984-85 and 1987-88. The steel consumption may likely to go up as a result of increase in con-construction and rural development activities envisaged in the Sixth Five Year Plan.

The minimum and maximum demand growth of grinding wheels is as follows:

Table 7: GROWTH RATE AT MINIMUM & MAXIMUM

| Year | Growth rate at | |
|---|---|---|
| | 3% Minimum (Tonnes) | 8% Maximum (Tonnes) |
| 1984-85 | 11,227 | 11,772 |
| 1987-88 | 15,862 | 16,632 |

Taking into account the growth in demand and installed and licensed capacities, it is doubtful if any substantial new capacities can be set up without causing any distress to the existing and licensed units.

The Government is restricting to import certain types of grinding wheels besides allowing to import specialised types of grinding wheels which are used in razor blade and ball bearing industries. According to the industrial policy, the financial and technical collaborations may be considered based on individual merits, only for certain specialised grinding wheels, such as, rubber bonded, bakelite bonded and special purpose grinding wheels needed for the manufacture of razor blades. Existing units are allowed to expand into small capacities to manufacture special types of grinding wheels.

The raw materials required are special abrasives and white aluminium silicon carbides. If there is any shortage of these items and the industry is not able to deliver these items in time it would hit the entire engineering industry sector besides affecting the grinding wheels production. Analysing the installed and licensed capacities which are about to materialise soon, there is no scope for further licensing. But the existing units are encouraged to go for additional capacity to manufacture special type of grinding wheel in small quantities.

Annexure I

## GRINDING WHEELS: EXPORTS

| Year | Types of Grinding Wheels | | | | | | | | Total Export | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Dia. Impr. | | Natur. St. | | Sy. Abr. | | Other Gr. Wheels | | | |
| | Qty. Rs | Value Rs | Qty. Rs | Value Rs | Qty. Rs | Value Rs | Qty. Rs | Value Rs | Qty. Kg. | Value Rs |
| 1972-73 | 43 | 27411 | 183422 | 358756 | 53558 | 346985 | 94692 | 313188 | 331715 | 1046340 |
| 1973-74 | 907 | 621323 | 52442 | 1155459 | 234357 | 1438836 | 102050 | 278939 | 399756 | 9083657 |
| 1974-75 | 39 | 61312 | 113335 | 287306 | 557970 | 4403047 | 177318 | 542457 | 848762 | 5294122 |
| 1975-76 | 24 | 17222 | 52804 | 166567 | 135973 | 1551148 | 362889 | 1635840 | 551690 | 3370777 |
| 1976-77 | 32 | 48962 | 48389 | 227789 | 160989 | 1918971 | 419252 | 2909622 | 628762 | 5105344 |
| 1977-78 | 60 | 14347 | 35 | 240 | 233557 | 3220103 | 864011 | 4223650 | 1097663 | 4560240 |

Note: Dia. Impr. = Diamond Impregnated
Natur. St. = Natural Stone
Sy. Abr. = Synthetic Abrasive
Other Gr. Wheels = Other Grinding Wheels.

Annexure II

## GRINDING WHEELS: IMPORTS

| Year | Types of Grinding Wheels | | | | | | | | Total Export | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Dia. Impr. | | Natur. St. | | Sy. Abr. | | Other Gr. Wheels | | | |
| | Qty. Rs | Value Rs | Qty. Rs | Value Rs | Qty. Rs | Value Rs | Qty. Rs | Value Rs | Qty. kg | Value Rs |
| 1972-73 | 58 | 131540 | 3998 | 170208 | 167515 | 1991207 | 27322 | 668583 | 199883 | 2961538 |
| 1973-74 | 907 | 621323 | 52442 | 115459 | 234357 | 1438836 | 102050 | 278939 | 389756 | 1250078 |
| 1974-75 | 203 | 225613 | 1178 | 45729 | 61389 | 1757806 | 106213 | 863554 | 168983 | 2892702 |
| 1975-76 | 1964 | 205615 | 2039 | 101017 | 116589 | 3406868 | 22505 | 1218521 | 143097 | 4932021 |
| 1976-77 | 646 | 294553 | 3258 | 502627 | 54873 | 2176967 | 38127 | 1939166 | 96904 | 2913313 |
| 1977-78 | 17837 | 418539 | 13277 | 714825 | 84533 | 3403495 | 71678 | 5406330 | 187325 | 9943189 |

Note: Dia. Impr. = Diamond Impregnated
Natur. St. = Natural Stone
Sy. Abr. = Synthetic Abrasive
Other Gr. Wheels = Other Grinding Wheels.

# Current Technical Literature

## SCIENCE AND TECHNOLOGY

### Technology Transfer

135. ----: Beyond transfer of technology. Chemisphere, 1980, 5(4), 29-32.

Discusses the objectives of development policies and social relevance of the transfer of technology. (MSR)

136. BHOOTA, B.V.: Technology transfer: Needs and methods. Industrial Researcher, 1980, 6(4), 235-238.

137. BINDAL, M.C.: Technology transfer. Chemical Age of India, 1980, 31(4), 307-309.

Examines the technology that the developing countries need and highlights mode of technology transfer and Government's role of ensuring adequate transfer of technology. (BS)

138. O'KEEFE, L & HOWES, M.: A select annotated bibilography: Indigenous technical knowledge in development. IDS Bulletin, 1979, 10(2), 51-58.

This international bibliography of indigenous technical knowledge made use of by rural population, contains abstracts of over 35 articles and monographs. The topics covered are wideranging from agriculture, agricultural equipment, bamboo tube wells, irrigation, nutrition to ecology. (VKT)

139. PILLAI, P.M.: Technology transfer, adaptation and assimilation. Economic and Political Weekly, 1979, 14(47), M121, M123-M126.

This article begins with critical evaluation of claims of Indian technological capability, and notes on the part of even relatively well-developed sectors of Indian industry, a strong and persistent desire for continued junior partnership with foreign collaborators. It examines the extent to which imported technology has actually been adapted and assimilated with a view towards self-generation. It argues that Indian exercises in transfer of technology actually serve to inhibit development and utilisation of technological potential both in India and in recipient countries leading to self-perpetuating dependence. (AA)

RESOURCES

Waste Utilisation

140. PANDEY, S.N & MEHTA, A.K.: Particle boards from cotton stalks. Research and Industry, 1980, 25(2), 67-70.

A process enabling the utilization of cotton plant stalk and other agro-wastes in the preparation of a variety of boards is described. The characteristics of the boards and the uses to which they can be put are discussed. The relevance of the process to the rural economy is brought out.

141. PAUL, S & JHA.: Ethanol from agri-waste. Chemical Weekly, 1980, 1980, 26(6), 57-60.

Possibilities of producing ethanol from agricultural wastes have been described. The economics of producing ethanol, the problems of collection of the raw materials, their organization and management are explained. The implications of the change are discussed. (MSR)

CHEMICAL INDUSTRIES

142. ----: Alkali industry in India 1979-80: A review. Chemical Weekly, 1980 (Annual number), 85-91.

Reviews the developments in caustic soda, soda ash and chlorine industries. Gives installed capacities, production and capacity utilization of the above chemicals. (MSR)

143. ----: Production of citric acid. Indian Chemical Manufacturer, 1980, 18(9), 10-20.

Discusses the aspects of recovery and purification, concentration and crystallization and also gives an exhaustive list of references on citric acid. (BS)

144. BALASUBRAMANIAN, S.: Aliphatic dimethyl amides. Manmade Textiles in India,1980, 23(5), 245-249.

Discusses the manufacturing process for dimethyl formamide and dimethyl acetamide and enumerates their properties. (BS)

145. GURUNATH, M.M & VENKATESH MANNAR, M.G.: Salts and chemicals from sea water. Chemical Weekly, 1980, (Annual number), 93, 95, 96.

Discusses the important applications of salt in chemical industry. Gives present production capacity and projected production. Describes the

World market situation and the position of India in the export front. The internal demand and Worldwide demand are given. Highlights the possibilities of the other chemicals to be extracted from sea water. (MSR)

146. KAMDAR, B.M.: Selection of filter cloth. Chemical Weekly, 1980, (Annual number), 228.

Factors to be considered in selecting filter cloth are discussed. (MSR)

147. KAPUR, J.C.: Inorganic chemicals during the eighties. Chemical Weekly, 1980, (Annual number), 81, 83, 84.

Explains the importance of inorganic chemicals as raw materials to the process industries and discusses the present position and future requirements of sulphur, rock phosphate and salt and suggests alternatives. Also discusses about the cost of machinery and some of the major technologies which appear to emerge during the eighties. (MSR)

148. OTHMER, D.F.: Alcohols as fuels and chemical feed stocks. Chemical Weekly, 1980, (Annual Number), 185-190.

Applications of alcohol and economics of production are discussed. Available technical and economic data are analysed for setting up of methanol plant. Private financing of methonal plants is suggested. (MSR)

149. PANCHARATNAM, S.: Scope and technology for marine chemicals. Chemical Engineering World, 1980, 15(8), 33-39.

Simplified processes have now been developed for most chemicals to make their recovery from bitterns commercially viable. Growing demand and high prices of these basic chemicals add further incentive to these projects along with import substitution and export potential.

150. SESHAN, A.G.: Safety in chemical industry. Chemical Weekly, 1980, 26(5), 53-54.

Outlines the possibilities of toxic substances entering into the body and describes the preventive measures to be taken into consideration while handling toxic substances. (MSR)

151. STRASSER, B.: New developments in alkaline chloride electrolysis processes. Chemical Age of India, 1980, 31(1), 9-22.

Reviews various process steps and discusses the novelties of membrane electrolysis in comparison to the two conventional processes giving illustrations and data. (BS)

152. TRIVEDI, D.M.: Chemical industry in search of innovative technologies. Chemical Weekly, 1980, (Annual number), 73, 75.

Explains how the industry is wasting energy on not-so-useful technologies and emphasises the need to improve the technologies in order to utilize the available resources to the optimum level. (MSR)

153. VENKATESWARAN, S.L.: Organic chemicals - Orientation for the future. Chemical Weekly, 1980, (Annual number), 153-156.

The policy evolved and adopted subsequently together with drawbacks to establish basic organic chemicals has been summarised. Present picture and targets have been given. Present status in respect of basic organic chemicals, estimated demand and gap in capacity, expected demand, production and deficits of petrochemicals in 1982-83 and perspective plan for alcohol based chemicals have been presented in tabular form. (MSR)

## SOAPS, PERFUMES AND COSMETICS

154. ----: Formulations. Soap, Cosmetics, Chemical Specialities, 1980, 56(6), 62B, 62C.

Gives formulae for AOS shampoo, low pH gel shampoo, protein shampoo, clear shampoo, pearly conditioning shampoo, clear conditioning shampoo and ruff control shampoo, pearly shampoo, opaque conditioning shampoo, shampoo concentrate, and gel shampoo. (BS)

155. ----: Know all about detergents. Colour and Chemicals Weekly, 1980, 6(31), 42-43.

Properties and uses of various detergent builders are briefly mentioned along with a listing of household detergent powders of two types of grades. An outline of the manufacturing process of detergent powders is also given. (CV)

156. ----: Natural or synthetic cosmetic raw material survey. Manufacturing Chemist & Aerosol News, 1980, 51(5), 43-45.

Gives some of the alternatives to natural products and some materials that nature has not thought of yet. (BS)

157. ANONIS, D.P.: Perfumes in bath preparations. Drugs & Cosmetic Industry, 1980, 126(6), 40-42, 44, 134.

Reviews more recent cosmetic materials, their application in newer type bath preparations. Also discusses perfuming problems with bath products. (BS)

158. DOUGHERTY, R.W.: Household surfactants in the 1980s. Soap, Cosmetics, Chemical Specialities, 1980, 56(4), 60-62, 64, 66.

Gives the current size of the US market for cleaning products. Reviews the growth trends in population and supply and demand for cleaning products.

159. GUPTA, B.R.: Exports of cosmetics and toiletries: Vast untapped potential. Eastern Economist, 1980, 75(3), 247-248.

According to a market survey there is a vast potential for the export of cosmetics and toiletries. The author believes that these exports can reach ₨ 150 crores by 1981-82 and can exceed ₨ 670 crores by 1990 provided arrangements are made for increased production through such synthetic inputs as musk ketones, cinnamic alcohols, esters, etc. (BS)

160. IYER, S.N.: Quality control aspects concerning cosmetic raw material and finished products. IDMA Bulletin, 1980, 11(9), 93-95.

161. JOHNSON, V.L.: Proteins in cosmetics and toiletries. Drug & Cosmetic Industry, 1980, 126(6), 36-39, 136.

162. MALONEY, R.A.: Perfuming of natural ingredients in cosmetics. Drug and Cosmetic Industry, 1980, 127(3), 54, 56, 60, 118.

In creating cosmetics that have a nice feel on the skin, that hold water and oil in suspension, that do not separate and that have appealing viscosity, many different natural ingredients have been used. These include gums, plant exudates, seed extracts, and waxes, all materials derived in some way from living plants. Discusses the perfuming of these natural ingredients in cosmetics. (BS)

163. WHALLEY, G.R.: Toilet soap - An assessment of quality. Soap, Perfumery & Cosmetics, 1980, 53(6), 330-331, 333.

Gives some tips to assess the quality of toilet soap.

164. WORNER, P.: American perfume trends in the 1970. Manufacturing Chemist & Aerosol News, 1980, 51(4), 60, 61, 64, 65, 67.

## DYES

165. ----: The dyestuff industry in India - A review Chemical Weekly, 1980, (Annual number), 223, 225.

A review of the dyestuff industry is given. Production statistics of synthetic dyestuff in India (1976) are tabulated. (MSR)

166. MEHTA, M.B.: Scope for establishment of dyestuff industry in South India. Chemical Weekly, 1980 (Annual number), 224-225.

Highlights the scope for establishing dyestuff industry in South India with the support of the market survey for various types of dyes and locational possibilities and manpower availability. (MSR)

## DRUGS AND PHARMACEUTICALS

167. ----: Profile of the Indian pharmaceutical industry. Chemical Weekly, 1980, (Annual number), 191-197.

A review of the Indian pharmaceutical industry is given. Investments, employment and R & D in this area is outlined. Bulk drugs production and future requirements and export statistics are given. (MSR)

168. ----: Psyllium husk - an exchange earner. Chemical Weekly, 1981, 26(17), 68-69.

Presents the status of psyllium cultivation and its market. Gives its potential use as raw material to produce laxatives. (MSR)

169. PATANKAR, A.D.: Manufacture and availability of basic chemicals, solvents and intermediates. IDMA Bulletin, 1980, 11(39), 529-536.

A list of basic chemicals and intermediates and solvents which are in adequate supply is given along with the drugs for which they are used. (MSR)

170. VIRAMANI, O.P.: Current status of medicinal plant industry in India. Indian Drugs, 1980, 17(10), 318-340.

Discusses the sources of medicinal plants and their medically active ingredients and applications. Gives production figures of quinine, crude drugs and other alkaloids. Tabulates the exports and imports of drugs & alkaloids. (MSR)

## RUBBER

171. ----: Expansion of S.B.R. capacity. Rubber News, 1980, 20(1), 34-37.

Gives the statistics on demand, supply and deficit for 1984-85 and 1989-90 for natural rubber, synthetic rubber (SBR & PBR) and the production and consumption figures for natural rubber and SBR during 1963-64, 1970-71, 1974-75, and estimated figures for 1980-81. (KSDR)

172. ----: Production of rubber floor tiles. Rubber Digest, 1979 (1), 6-9.

Gives the advantages and a typical formulation for the production of floor tiles. (KSDR)

173. ----: World rubber consumption and the motor industry. Rubber News, 1980, 20(2), 33-40.

Gives the world statistics on passenger car production and commercial vehicle production in order to summarise the global picture of tyre production and to outline the effects of certain changes and innovations on rubber usage.

174. KULKARNI, D.S.: The Indian rubber industry. Rubber India, 1980, 20(3), 33-38.

Gives the production of rubber goods in 1977, 1978 and 1979, demand for auto tyres in 1984-85 and 1989-90, demand for non-tyre products, and demand, estimates for rubber during 1984-85 and 1989-90.(KSDR)

175. KULKARNI, D.S.: The rubber industry of India. Chemical Weekly, 1980 (Annual number), 235-236.

An overview of the rubber industry with historical perspective is given. (MSR)

176. PATEL, M.M.: Nitrile rubber and its applications. Rubber News, 1980, 19(12), 33-43.

Indicates some of the general and special purpose rubbers along with their chemical structure, properties and describes the manufacturing process of acrylonitrile butadiene rubber (NBR) and the applications of nitrile rubbers with selected formulations.(KSDR)

## LEATHER INDUSTRY

177. DURAISWAMY, B et al: Round belting leather. Leather Science, 1980, 27(8), 266-267.

178. KAMAT, D.H et al: Alternative sources and technology for making nappa and softy leathers. Leather Processing, 1980, 4(3), 15-16.

Possibility of making nappa and softy leathers from buffalo, cow and goat skins by certain modification in bating, pickling, tanning and fatliquoring is indicated. The approach consists of acid bating in addition to normal bating pickling under pressure in the presence of napthalene sulphonic acid, retanning with chrome syntan and fatiliquoring using a mixture of marine and synthetic fatliquors. Variety of leathers such as softy shoe upper, clothing and gloving leathers could be produced following the above approach

179. MANIVEL, U et al: Acid-resistant book binding leather. Leather Science, 1980, 27(8), 257-259.

One of the important requisites of bookbinding leather is its resistance to acid rotting. The leather has to withstand the possible acidity of the atmosphere caused due to the presence of acid fumes. Titanium tanned leathers are found to resist the deteriorating action of acids. Practical tanning of goat skins using titanium tanning agent for the retanning of vegetable leathers is carried out to obtain the skivers and they are found to be distinctly more resistant to acids than those made by conventional process. The process in detail is given.

180. MANIVEL, U et al: Use of titanium tanning for the production of abrasion-resistant and flexible vegetable tanned sole leathers. Leather Science, 1980, 27(8), 260-262.

From the consumers point of view, sole leathers should have good resistance to abrasion. Use of basic titanium tanning salt as a pretanning agent followed by normal vegetable tanning provides flexible sole leathers of standard quality besides being highly resistant to abrasion. Only 50% of the leather thickness is found to get abraded when compared with control sole leathers under comparable conditions. Such titanium retan leathers can find extensive application wherever abrasion is a factor. The process followed is given in detail.

181. NEUNERDT, K.H.: White finishes with high physical properties. The Leather Manufacturer, 1980, 98(1), 22, 24, 25.

Discusses the chemical composition, advantages and disadvantages and properties of a new range of reactive, polymerizable leather finish dispersions. (BS)

182. PARTHASARATHI, K et al: Needle polishing leathers by oil tannage. Leather Science, 1980, 27(4), 135-136.

183. SANTHANAM, P.S & RAMKUMAR, S.C.: Role of acrylic resins in leather finishing. Leather Processing, 1980, 4(3), 13-14.

184. SUBBA RAO, M et al: Upper leather from raw sheep skins (red hari). Leather Science, 1980, 27(8), 263-265.

185. VENKATESWARA RAO, M & GANESAN, A.: Semi-chrome alum, (combination tanned) softy bag leathers. Leather Science, 1980, 27(6), 192-194.

Discusses the raw materials required and the process.

186. VENKATESWARA RAO, M & GANESAN, A.: Soft bag leathers. Leather Science, 1980, 27(6), 195-198.

## METALLURGICAL INDUSTRIES

187. ----: Be a high quality welder. Industrial Welder, 1980, 10(5), 11-20.

Describes the arc welding process in detail by giving definitions to the important terms used. Gives some guidelines for the selection of electrodes along with the electrode classification and coating. Test procedure to conducted to assess the ability of a welder to weld a particular type of joint is given. Discusses also about the different types of non-destructive tests that could be carried out for welding inspection. (CS)

188. ----: Explosion welding, Industrial Welding, 1980, 10(3), 17-19.

The theory, advantages and applications of the process are discussed. Explosives used and the required engineering considerations are also mentioned. (CS)

189. BHATGADDE, L.G.: Cementation of copper powder on aluminium sheet. Research and Industry, 1980, 25(2), 71-73.

Fine copper powder has been produced by cementation on aluminium sheet immersed in an aqueous solution of copper sulphate and sodium chloride. From 2.8 g aluminium, 1 g copper powder can be produced by cementation. The process yield in terms of the proportion of copper powder recovered to the initial copper content of the solution is 85.3%. The particle size of the powder falls with reduction in copper concentration in the solution.

190. ESSERS, W.G et al: The plasma-MIG welding process. Industrial Welder, 1980, 10(7), 18-22.

The principle of the equipment and welding characteristics of the process are described. Examples are given of welding thin plate (high traverse speed,) cladding (low penetration), thick plate (high deposition rate), aluminium (high quality) and copper (high heat input).

191. KAMAT, G.P & SINGH, N.H.: Selecting the correct welding processes for greater productivity. Industrial Welder, 1980, 10(11), 11-18.

The different welding processes discussed include, shielded metal arc welding by covered electrodes. (SMAW), gas tungsten arc welding (GRAW), pulsed TIG welding, gas shielded metal arc welding (GMAW), flux cored arc welding (FCAW), submrged arc welding with single electrode (SAW) and submerged arc welding with twin electrode in tandem. Factors to be considered before selecting any welding process are given along with case studies. (CS)

192. SUBRAMANIAM, R.: Destructive & non-destructive testing and inspection of welds. Industrial Welder, 1980, 10(7), 11-13, 14-17.

The destructive and non-destructive testing and inspection of weldments before, during and after fabrication and of the evaluation of the quality of the weldment in terms of the required quality are outlined. (CS)

193. TOTTY, D.R.: An alloy to solve cast iron brazing problems. Welding and Metal Fabrication, 1980, 48(8), 529, 530, 532, 533.

Established brazing procedures are outlined and recent work on grey irons is discussed in detail.

## ELECTRONICS INDUSTRIES

194. BHATNAGAR, R.S.: The rise and fall of the television industry. Electronics for You, 1979, 11(8), 37-40.

Explains the problems and the position of the TV industry in India. (BSR)

195. HARIDAS, V.K.: Screen printing techniques for the electronics industry. Electronics for You, 1979, 11(1), 27-30.

Explains the photographic printing screen methods namely direct method screens indirect method or transfer method screens. The required photo and diagrams are given. (VVR)

196. KOHLI, V.K.: Intruder alarm. Electronics for You, 1979, 11(8), 59-60.

Describes a simple burglar alarm system which can be constructed easily. The alarm is fail-proof and will sound as soon as some one opens the main door or any other protected door or window in the house. (BSR)

197. ZESKIND, D.A.: Thermoelectric heat pumps cool packages electronically. Electronics International, 1980, 53(17), 109-113.

Explains thermoelectric heat pumps which are solid-state devices with no moving parts. With suitable electrical power, input, these pumps will be able to cool or heat a component or group of components and also capable of generating electric power. (VVR)

# SENDOC Services

Featured in this section are technical enquiries that were received and the services rendered by SENDOC during the month of February, 1981. The charges for short technical enquiries will be ₨ 5.00 to ₨ 10.00 per typed page. Industry profiles already available with SENDOC are charged at the rate of ₨ 11.00 each.

| S.No. | Enquirer | Service Rendered |
|---|---|---|
| 1 | 2 | 3 |
| 1. | DIC, Srikakulam, Andhra Pradesh | Profile on: Alcohol from Mahua flowers |
| 2. | DIC, Yavatmal, Maharashtra | Profiles on: Hydrated lime, Office gum and pastes |
| 3. | Ent. Andhra Pradesh | Profiles on: Automobile gaskets, Copper sulphate, Metallic watch strap, Straw board, Paper envelope, Office gum & pastes, HDPE pipes, Rigid PVC pipes, Distilled water, Steel round drums, Pilfer proof caps, Stone crushing, Polythylene coating cloth paper. |
| 4. | Ent. Bihar | Profile on: Glycerine |
| 5. | Ent. Gujarat | Technical note on: GLS lamps<br>Profile on: Distilled water |
| 6. | Ent. Karnataka | Profiles on: Rice mill, Pharmaceutical unit, Bicycle gear cases, Maize starch, Saw mill/ wood seasoning plant |
| 7. | Ent. Madhya Pradesh | Profile on: Caustic soda |
| 8. | Ent. Maharashtra | Profiles on: Coconut shell flour, Rubber vee and auto fan belts, Vanaspathi, Chlorine ampoules, Sulphuric acid, Ethyl alcohol, Caustic soda, Rice Bran oil, Welding electrode, Cement, Grey board-Straw board, Mill board, |

| 1 | 2 | 3 |
|---|---|---|
| | | Decorative laminate, Ferric alum, Cotton waste blanket, Corrugated boxes, Cattle feed, Camphor tablets, Modern rice mill, Alcohol from molasses, Coconut oil, Industrial adhesives, Clutch plates, Refining of oils, Oil seed crushing, Oil mill |
| 9. | Ent. Orissa | Profile on: Agricultural implements - wooden handle, Bicycle chain, Wooden textile bobbin, Pencil slate, Particle board, Small springs, Industrial coil springs, Solder and flux, Laminated jute bag. |
| 10. | Ent. Pondicherry | Profile on: Industrial adhesives |
| 11. | Ent. Punjab | Profiles on: Asbestos cement sheets, Mild steel wire drawing. |
| 12. | Ent. Uttar Pradesh | Profiles on: Industrial greases, Regeneration of used engine oil |
| 13. | Ent. West Bengal | Profile on: Battery container |
| 14. | FI Orissa | Profile on: Electrolytic capacitors |
| 15. | GD Andhra Pradesh | Profile on: Aluminium builders' hardware, Aluminium water supply fittings, Brass cocks |
| 16. | GD Tamil Nadu | Profile on: Biscuits |
| 17. | IC Gujarat | Profile on: Stainless steel utensils |
| 18. | SI Andhra Pradesh | Profile on: Rubber rollers for rice mill, Rigid PVC pipes, Transmission line hardware, Distilled water for battery charging, Pharmaceutical unit (Tablets) |

| 1 | 2 | 3 |
|---|---|---|
| 19. | SI Bihar | Profiles on: Toilet soap, Detergent powder, Glazed tiles, RCC spun pipes |
| 20. | SI Jammu & Kashmir | Profile on: PVC Pipes |
| 21. | SI Karnataka | Profile on: Aluminium utensils |
| 22. | SI Madhya Pradesh | Profiles on: Polyethylene pipes, Polyethylene tubing |
| 23. | SI Maharashtra | Profiles on: Steel utensils, Tomato sauce/ketchup, Polyethylene bags, GI buckets, Flexible metallic tubes, Confectionery and biscuits<br>Technical note: Paper from bagasse |
| 24. | SI Uttar Pradesh | Profile on: Bright bars, Drums and barrels. |

Note: DIC - District Industries Centre
Ent. - Entrepreneur
FI - Financial Institution
GD - Government Department
IC - Industrial Consultant
SI - Small Industry

*Section I*

# New Products and Processes

## AGRO-BASED INDUSTRIES

### Paper Boards from Agricultural Wastes

The Regional Research Laboratory, Jammu commissioned a 0.5 tonne per shift capacity semi-automatic pilot plant for processing wood and fibre wastes into paper boards of various types for different uses. Agricultural waste materials such as paddy straw, pine needles, wild grasses and fibre wastes like tailor cuttings, discarded gunny bags, etc., can be converted into utilizabale boards like boards for book bindings, boards for packing shoes, greeting cards, file covers, strong wrapping paper and hard boards.

The pilot plant consists of an automatic digester-heater for pulping purposes and a continuous mechanical sheet forming unit. The manual operations involved are removal of the sheets from the sheet former and their transfer to the drier. The dried sheets are fed into calendering and trimming machines to produce the final product. Drying of the wet sheets is carried out in a tunnel type drier set up alongside the main unit.

The multipurpose pilot plant is the first of its kind particularly suitable for the utilization of unconventional raw materials and wastes for board manufacture.

It will also be used for purposes of demonstration to and training of entrepreneurs interested in setting up commercial board making units. A commercial plant of 2.5 tonnes per day capacity is likely to entail an investment of ₨ 10.5 lakhs. In terms of its simplicity, low cost and ease of operation, it may prove to be 'appropriate' for establishment in the small scale sector in rural areas where raw materials like paddy straw, pine needles and other agriculture wastes are available.

### Sodium Silicate from Rice Husk Ash

The Central Glass and Ceramics Research Institute, Calcutta has developed a process for the manufacture of sodium silicate from rice husk ash. The process is suited for small scale production and yields sodium silicate of varying grades and compositions, ranging from 25 to 33% $Na_2O$. Sodium silicate is used in the production of a variety of products, such as soaps, detergents, desiccants, etc.

The process consists in producing sodium hydroxide from sodium carbonate and lime and making the sodium hydroxide solution obtained to react with rice husk ash. After the completion of the reaction, the solution is filtered and concentrated to the desired strength. The raw materials used are of commercial grade.

The main advantages of the process over the conventional method of manufacture are: 1) it is simple, with relatively low capital investment, (2) the energy consumption is low, (3) the cost of production compares favourably with that by other methods, and (4) the iron content of the product is low.

The process is available for exploitation through the NRDC of India.

## CHEMICAL INDUSTRIES

### Chloroscope

Chloroscope is a handy gadget for residual chlorine in water, in the laboratories and the field. It can find use in public health laboratories, water treatment plants and community water supply schemes.

At present, such an apparatus even though produced in the country, is still imported to meet the demand. So there is a wide scope for its use and the gadget merits commercialisation.

All the raw materials are available indigenously. The National Environmental Engineering Research Institute, Nagpur has manufactured a few units in a limited scale.

Electrical grinding and buffering machine, electrical small fret saw machine, injection moulding machine, blow moulding machine, constant temperature hot air incubator cum oven, steel dye are some of the essential items of plant and machinery required for the manufactureof chloroscope.

The suggested economic unit for the industry is for 8000 units per year and the total investment will be about ₨ 1,50,000. The cost of production has been estimated at ₨ 22/- each. The present selling price is ₨ 45/- each. The manufacture of these chloroscope can conveniently be taken up by any small scale plastic unit.

Terms and conditions for know-how transfer:

Lumpsum premium ₨ 2,500/-

Recurring Royalty 5% on sales

Nature of Licence Non-exclusive

Period of licence 14 years

## Rubberised Corksheets from Waste Granules

Rubberised cork sheets are mainly employed for use as gaskets in automobile engines. These gaskets are generally used for replacement purposes. Though data regarding their consumption is not available, they have good market potential in our country. These gaskets have already found their way into the market.

National Chemical Laboratory, Poona has developed a process for the manufacture of rubberised cork sheets from waste cork granules. The process consists of mixing the waste granules with appropriate quantity of synthetic rubber (nitrile or neoprene) along with other ingredients and vulcanizing the mix in suitable moulds under pressure and at elevated temperature.

The laboratory has produced sheets of 15 cm x 23 cm x 3.5 mm size. These have received good consumer acceptability.

Cork granules required for the process are available as a waste from cork factories. Synthetic rubber and other raw materials required are available indigenously.

The major items of equipment are two roll rubber mixing mill, steam or electrically heated hydraulic press, cutters and moulds. These are either readily available indigenously or could be fabricated by rubber machinery manufacturers.

The capital outlay for a plant having a capacity to process 3 tonnes of waste granules, that is, 5 tonnes of finished product per annum is estimated at ₨ 0.15 million. 4 persons would be required for operation of the plant. The process has been licensed to one party, which is in production.

## Trisodium Phosphate for Chemical Phosphating of Ferrous Items

Phosphate coating on steel is done to increase paint life, improve adhesion of paint to metal surface, and reduce friction in wire making, tube making, body pressing and other deep drawing operations. At present phsophate coatings are produced by treating metallic items with phsophoric acid or solutions of primary phosphates of manganese, iron, zinc or cadminum. The various processes that are currently employed are mostly proprietory processes, such as parkerizing, bonderizing and phosphatizing. These processes have certain disadvantages such as the use of costly raw materials in phosphating compositions and use of high temperatures. The process of anodic phsophating, in which acidified sodium phosphate solution is used and which consists in passing electric current at room temperature, suffers from the drawback that a rectifier is needed, which makes it expensive for small operators.

The process developed by the Central Electrochemical Research Institute (CECRI), Karaikudi, is free from these drawbacks. It is a simple chemical process which, using trisodium phosphate, produces iron, zinc and manganese phosphate coating on steel. In the process, a heavy metal phosphate (iron, manganese or zinc) and an accelerator ($NaNO_2$, $NaClO_3$, $H_2O_2$) in the acidified sodium phosphate solution in measured quantities are used for phosphating ferrous items. The process has been studied on a 100-litre scale.

Trisodium phosphate, hydrochloric acid, sodium nitrate and nitrite, sodium and potassium chlorates, and chromic acid are the main raw materials required in the process. All are available indigenously.

The items of plant and machinery required are: phosphating tanks (MS), rinsing tanks (MS), slurry receiving tank (MS), filtrate receiving tank (MS), ion exchange column, cation exchange resin, filter press, water de-ionizer, storage tank, pumps, pully block, and jigs (MS). All these are available indigenously.

The total investment for a plant having a capacity of phosphating 500 $m^2$/day (8 hr) has been estimated at ₨ 2.57 lakh. The break-up is as follows: fixed capital on building ₨ 1,44,000; fixed capital on plant, ₨ 97,000; and working capital, ₨ 47,000. The cost of production has been worked out at about 80 paise per square metre of phsophating area.

The phosphate coatings produced were tested according to ISI specification for corrosion resistance and were found to conform to the specifications as per IS (Class C coatings).

## ELECTRONICS AND ELECTRICAL INDUSTRIES

### P.C.B. Drilling Machine

Printed Circuit Boards (PCB) are used by electronic industries for assembling circuits of various instruments and equipment. The components are mounted on the printed circuit equipment. The components are mounted on theprinted circuit boards by inserting the leads of the components through the holes provided on the PCB for this purpose and soldering the component ends to the copper clad side. Consequently precision drilling of PCB holes is one of the important factors necessary for good quality of the assembled printed circuit boards.

Conventional drilling machine, for making holes on the PCB operates from the top of the job. The present PCB drilling machine, which has been designed and developed by the Central Electronics Engineering Research Institute (CEERI), Pilani, operates from the bottom of the PCB. The advantage of this modification is that the drilling operation gives burr-free holes. Added advantages of the newly designed drilling machine are that accurate positioning of the holes can be done very quickly and that time per hole is very much less, compared to conventional method. Consequently it reduces fatigue to the operator considerably. Board specifications of the equipment are given below:

| | |
|---|---|
| Drilling capacity | 0.5 mm dia to 1.5 mm dia |
| Depth of drilling | 6 mm |
| Spindle speeds | 3000/6000/9000 rpm |
| Drilling speed | 40 holes per minute in a single board (or in a 6 mm stack of PC Boards, with a template) |

Cast iron bases for stand, mild steel parts, gun metal bushes, electric motor etc., are the raw materials required.

General engineering work shop equipments like lathe, milling machine, drill, grinding machine, power hacksaw, hand tools etc., are the equipment needed.

For a plant to manufacture about 100 units per year, the capital requirements would be about:

Fixed capital (excluding land & buildings): ₨ 20,000/-

Working capital: ₨ 60,000/-

Cost of production: ₨ 2,250/- per machine

It will be advantageous for an existing machine tool manufacturer to take up the production of this machine, so that additional investment needed for the production of this machine is nil or just marginal.

## X-ray Image Intensifier Closed Circuit Television System

X-ray image intensifier closed circuit television system is very useful in continuously viewing the X-ray images. It provides very low dosage of X-rays to the patient as the image is intensified by about 6000 times with the help of image intensifier tube. The image is displayed on a TV screen. The result is a bright clear image with very much less dosage. (about 20 times less than normal fluoroscopy). The image can be simultaneously viewed by several persons. The system is of immense diagnostic value in visualisation of bone fractures, observation of joint movements, visual control of catheter insertion, rapid examination of emergency room patients, localisation of foreign bodies etc.

The X-ray image intensifier tube is a vacuum tube having an input fluorescent screen and a photocathode which converts the X-ray pattern into electron pattern.

Referring to the block diagram, the X-ray image beam emerging from the subject being examined, first passes through the input window of the tube. The window is made of special low absorption, low scatter glass. It is then absorbed by the input detector screen where the X-ray photons are converted into light photons. A photocathode coupled to the input screen is excited by these light photons, producing electrons. The electrons thus emitted are accelerated and focussed by appropriate electric fields, and then impinge on the output fluorescent screen (type P20) which converts them into light photons giving a high brightness output image. In fact, this image is several thousand times brighter than a conventional radioscopic screen substituted for tubes input window. This brightness gain is obtained partly from the energy imparted to the electrons during their acceleration, and partly from the reduction in diameter of the tubes output image as compared to the input image.

The image at the output is magnified and coupled to the closed circuit television camera through a lens system. It is then displayed on the TV screen.

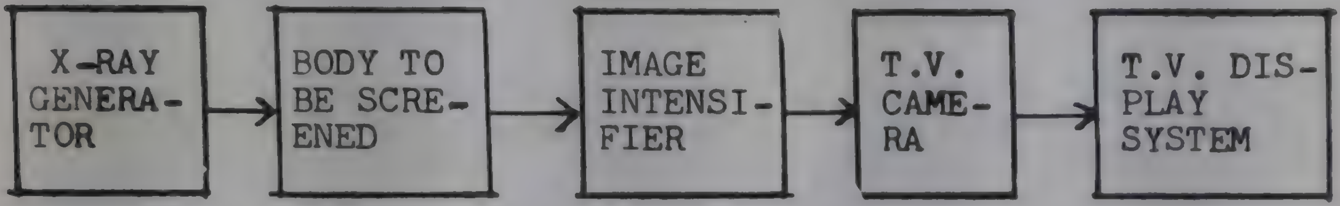
| | |
|---|---|
| 1. X-ray Machine | |
| Mobile X-ray Unit | Radiographic: 50 mA at 65 KV (Peak)<br>Fluroscopic: 50 mA at 65 KV (Peak) |
| 2. Image Intensifier Tube | Thomson TH 9415 |
| 3. Optical Coupling | Objective Lens |
| 4. Closed Circuit Television: system of type | Haritron Micro-Video Camera and Monitor |
| 5. High Voltage Power Supply (to be fabricated) | |
| Output voltage | 26 KV to 30 KV (adjustable) |
| Output current | 120 microamperes |
| Ripple | 0.5% |
| Oscillator frequency | 70 KHz ± 10% |

The main test equipment required will be universal avometer, oscilloscope, electrostatic voltmeter etc. The electrostatic voltmeter has to be imported.

The X-ray generator has to be purchased from the X-ray manufacturing unit and the X-ray image intensifier tube and the objective lens have to be imported. Other components are available indigenously.

It will be economical if an existing manufacturer of allied fields adds production of this system to this product group. Cost of production will be about ₨ 75,000/- per system.

Block Diagram



ENGINEERING INDUSTRIES

### Energy Saving Air Cooler

Many people depend on some form of airconditioning to provide a comfortable environment in their offices, factories and homes.

Although refrigerated airconditioners are usually quite effective in providing comfortable indoor conditions, they consume a fair amount of power. They are not cheap and skilled mechanics are needed for maintenance.

The other common choice for airconditioning, the cheaper evaporative cooler, has the disadvantage of adding to the humidity while cooling the air. When the humidity is low this may not be troublesome, but it is a severe disadvantage on more muggy days.

A new type of airconditioner that overcomes these problems and provides a continuous supply of fresh air is soon to go into production following successful field trials. An Adelaide firm, Hydro Thermal Engineering Pvt. Ltd. will be manufacturing airconditioners under licence to CSIRO.

A feature of the conditioner is its low energy consumption. The PHE cooler (Plate heat exchanger) uses between one-ninth and one-fifth of the electrical energy consumed by conventional refrigerated airconditioners doing a similar cooling job.

The Adelaide company plans initially to build units in two sizes. The first, big enough to cool small office complexes or factories, or whole houses draws in 1.5 cubic metres of air per second. The second is a smaller model with an airflow of up to 0.5 $m^3$ per second. The company intends to make both smaller and larger units later.

The performances of the coolers have been monitored as part of the testing program for the new conditioners. Despite the different conditions in which they had to operate-climate, building construction and water quality - all units performed as well as laboratory tests indicated they would.

PHE conditioners cool air as a result of the absorption of heat by water as it evaporates. As the resulting water vapour is released into the exhaust air circuit and outside the room or building being cooled, an increase in room humidity does not occur.

The plate heat exchanger provides the means of passing heat from the air being cooled to the evaporation water. Thin vertical sheets of plastic (the plates of the exchanger) are sprayed with water on one side. Warm outside air passes along the other side, and the plates 'exchange' heat from the air to the water. Outgoing air from the building passes over the moistened surface of the plates, taking the water vapour with it.

Small plastic projections on the plates keep them a few millimetres apart and stimulate turbulence in the air moving past. This increases the effectiveness of the heat exchanger.

Each plate is joined to one of its neighbours at the top and bottom and to its other neighbour at each end.

The result is a series of vertical and horizontal passages through the assembly. Water sprays, mounted above, keep the vertical exhaust passages moist. A fan blows fresh, outside air into the room through the horizontal passages and another fan draws return air from the room through the vertical passages.

The PHE units can also be used to reduce heating requirements in cold weather. The exchanger simply takes heat from exhaust air and transfers it to fresh air being drawn in from outside.

Tests at the Division show that the exchanger has an efficiency of about 85% when the unit is operating as a cooler and 70-75% when it is used as a heat recovery unit in winter.

Apart from being able to deliver fresh air in relatively large quantities, the PHE unit offers a number of additional features including compact dimensions and simplicity of operation. The fans, and a pump that returns unevaporated water to the sprays, are the only moving parts. There is no compressor as in refrigerated airconditioners. Servicing should therefore be kept to a minimum.

The PHE is suited to the task of providing cooling in all areas of Australia except the humid tropics. The quality of water used in it does not have to be high, as long as the flow is sufficient to avoid buildup of residue.

For more information: Hydro Thermal Engineering Pvt. Ltd.
PHE Systems, 23 Commercial Street, Marleston, S.A. 5033.,
Australia.

## Paddy Husk Combustor

Paddy husk, so long regarded as a waste, causing storage and disposal problem in rice mills, can now be used for commercial drying of paddy in the same mills where it is produced.

The Central Mechanical Engineering Research Institute, Durgapur and the Central Fuel Research Institute, Dhanbad have jointly developed a paddy husk combustor-cum-heat exchanger for drying parboiled paddy. The device was developed at the instance of Food Corporation of India (FCI) and Union Ministry of Food and Agriculture. The first plan installed at the FCI's rice mill at Durgapur has successfully completed its trial runs and has been recently handed over to the FCI for regular operations.

The plant has the capacity of drying about 1.2 tonnes of parboiled paddy by burning approximately 100 kg. of husk per hour.

Most of the modern rice mills in the country at present dry parboiled paddy in furnace oil fired driers. While such drying is costly, increasing scarcity of petroleum fuel, which is imported, adds to their problems. The development of the paddy husk combustor plant, therefore, will not only bring the waste husk into use, eventually reducing drying cost, but will also help conserve foreign exchange to a considerable extent.

The FCI alone has 22 rice mills with parboiling facility, each drying 60.80 tonnes of parboiled paddy per day with an average consumption of about 30 litres of furnace oil for drying one tonne of parboiled paddy. The annual requirement of furnace oil at the attainable capacity of 18,000 tonnes of paddy for these 22 mills works out to about 12,000 kilolitres valued at ₨ 1.85.

The installation consists of a vertical cylindrical combustor with a heat-exchanger amounted over it. The husk is fed by a screw conveyor and injected into the combustor with the help of conveying air from a blower and a distributor. The husk is burnt in suspension with primary air from a second blower, which is passed through a hollow main shaft and a stirrer is rotated very slowly, and a scraper attached to it removes the ash through holes at the bottom. The ash falls into a conical hopper and is removed through a porthole. A third blower supplying secondary air suppresses the flame to prevent it from touching the heat exchanger tubes. The fourth and the main blower draws in hot air from the heat exchanger and delivers it to the dryer through ducts.

The furnace temperature obtained is 600°-800°C, with an average husk feed rate of 15 kg. (one bag) in 8-9 minutes. The plant delivers 180-240 $m^3$ of hot air per minute at a temperature of 100°-130°C, ensuring drying of 4.8 tonnes of parboiled paddy (moisture content 13-14%) in a little over 4 hours.

The plant ensures 100% burning of husk inside the combustor. The ash can be used as fertiliser, in the production of cement, and for other potential applications.

The new system also completely eliminates any chance of sulphur contamination of rice, which normally occurs in furnace oil fired drying.

## METALLURGICAL INDUSTRIES

### Low Residual Iron and Soft Iron

Low residual iron and soft iron are used as raw materials for the production of permanent magnets, special steels and alloys. These products also find use as soft iron for electromagnetic relays by the railways, telephone, electronics and electrical industries.

The present requirement of soft magnets for the railways alone is estimated at about 20 tonnes/year. The estimated total annual requirement is about 250 tonnes which is met mainly through imports. The demand by 1980 is estimated to rise to about 500 tonnes. The present price of rolled flats and rounds (imported) is around ₨ 14,000/- tonne.

The meterial is manufactured in a basic direct electric arc furnace; plain carbon steel scrap with or without sponge iron is the raw material. Oxidizing and reducing slag practice is employed. The sulphur, phosphorus, carbon and manganese contents are checked during the melting and refining operations. Steel is finally tapped at the required specification.

Main raw materials are plain carbon steel scrap/sponge iron, ferrosilicon, ferromanganese, aluminium, limestone, fluorspar, etc., all these are available indigenously.

An electric furnace is required for steel making.

Predesign Cost Data

| | |
|---|---|
| Land and building | Existing |
| Plant and machinery | Existing |
| Working capital | 25% of annual sale price |
| Direct cost of production | ₨ 1250/- tonne |

Semi-industrial trials were carried out in a 500 KVA 3-phase direct electric arc furnace by the National Metallurgical Laboratory, Jamshedpur. The material was tested for its magnetic properties after forging, rolling and subsequent heat treatment. It gave results in the following ranges:

| | |
|---|---|
| Saturation induction | 15000-195000 gauss |
| Max. permeability | 6000-69000 gauss |
| Coercive force | 0.5-1.0 oersted |
| Residual induction | 4.500-6.500 gauss |

Satisfactory performance reports have been received from BHEL and Indian Railways.

The process can be conveniently exploited by an existing steel making unit utilising the spare capacity of its electric arc furnace.

## Solar Furnace

Utilization of solar energy on a large scale is a challenge which is now being taken up in both the developed and the developing countries in the world. In India, several organizations, both academic and others, have been tackling the problems relating to the tapping of energy from the Sun. One of the programmes that has been undertaken at the Indian Institute of Science, Bangalore is building of solar furnaces for metallurgical applications.

The basic principle is the use of a parabolic reflector dish to concentrate energy at the focus on to an absorber-receiver containing the material. The efficiency of heat input to the receiver depends greatly on the specular reflectance of the concentrator, characteristics of absorption and emission of the receiver surface. To receive one Kilowatt of solar energy, it is necessary to provide an energy of 14.3 kilocalories per minute. This can be provided by a collecting surface with an area of 1.43 square metres. Generating very high temperatures at the focus requires very high quality optics which is quite expensive. However, relatively low temperature furnaces generating about 700°C can be built inexpensively using spun and polished aluminium reflectors. Calculation shows that a 4 metre diameter concentrating reflector will provide a solar furnace which can melt 5 kg. of Aluminium in 30 minutes. Such a furnace can be used for melting, heat treatment of metals and alloys and generation of heat for rural industrial processes.

Three furnaces ranging in size from 50 cm diameter to 300 cm diameter using spun aluminium concentrators have been designed and fabricated at the Indian Institute of Science. The largest can be operated in the manual mode of tracking the sun. On sunny days a temperature of 850°C has been recorded at the focus. Optimum quantities of tin, zinc and aluminium alloys have been melted for casting purposes. The purity of the melt is a unique feature. Uses of such furnaces can be extended to foundries, candle making units and low temperature heat treatment of materials in heat treatment shops.

# New Machinery and Equipment

## ELECTRONICS AND ELECTRICAL EQUIPMENT

### Counter Timer

Counter timer is an instrument which has all the functions of an universal counter and also time interval measurement facility provided by means of 2 independent input channels for start and stop triggering.

The main features of Philips PM 6623 are:

250 MHZ frequency range, 100 ns single shot resolution, 100 ps. time interval average resolution, 10 mV (rms) sensitivity, temperature compensated crystal oscillator (option) Tri-state trigger indicators, Gate open monitor, external reset/start, automatic triggering, light, compact and portable.

High resolution: Time interval averaging technique of PM 5623 improves both the measuring accuracy and resolution of signals that are asynchronous with respect to time base. The maximum resolution works out to 100 os.

High trigger accuracy: Integrated circuit technology is effectively used to avoid rise time and delay differences between channels. Low hysteresis via the use of high sensitivity input amplifiers further reduces trigger errors.

Quick and accurate trigger level setting is possible because of the tri-state LED indicators and these trigger levels can be measured on a DVM or scope.

The multi-stage PIN diode attenuator prevents false counting due to distortion or noise, provides wide dynamic input voltage range and provides RF-input overload protection.

This counter/timer is ideally useful in R & D Laboratories, Telecommunication and data transmission, educational institutes, etc.

Further information from: S & I Department, Peico Electronics & Electricals Ltd. Shivsagar Estate, Block A, Worli, Bombay 400 018.

### Electronic Counting Machine

Tablet making is one of the largest activities of the pharmaceutical industry. Counting the tablets accurately is a tedious job. The state-owned Electronics Corporation of

India is now ready with a hygienic, non-contact electronic tablet counting machine which can be used for sorting out the tablets into different batches. The tablet counting machine is a table-top version, incorporating a compact design. It is a fast accurate and fatigue-free operating machine.

The bulk of the tablets stored in the hopper and conveyed to the turntable at a fixed rate by an electro-magnetic vibrator. The speed of the turntable is synchronised with that of the inflow of tablets on to it. A static spiral arrangement atop the turntable aligns the tablets into a single row which flow into the counting chamber having two outlets. The tablets are counted in the chamber electro-optically and when the set number of tablets are counted off, a flapper is actuated to direct the flow of tablets to the second outlet. Thus, filling with ease and accuracy is facilitated.

## Electronic Printers

Electronic Systems, a small-scale manufacturing unit in Nagpur, has developed a range of electronic digital printers. These include deak-top units for general laboratory/industrial use and panel mounting units with built-in motor driven paper take-up spool for recording data for extended periods of time. The printers print on ordinary paper.

The printers have a capacity to print numerical 0 through 9 and a decimal point upto 16 columns and print some special symbols in 2 columns (total 18 columns).

Printers are available for printing in 4/8/12/16 columns. They have a flexible input circuit and can accept either parallel BCD data (8-4-2-1) for each column or it can accept bit parallel digit serial data. It is also possible to accept parallel data for some columns and serial data for other columns.

The printing action can be initiated by the button on front panel or by an external signal.

The panel mounting printing systems with built- in paper take-up spool are an economical alternative to strip chart recorder specially because of use of digital indicators/controllers in modern panels. These printers have a wide application in industry, chemical and fertiliser plants, control rooms in power generation stations and distribution centres laboratories, research centres, institutions etc.

Some of the parameters that can be recorded by using appropriate input circuits are pressure, temperature, levels, speeds flow, time, etc. Any number of parameters can be recorded by providing special input multiplexing circuits.

## Electronic Rotary Measuring Unit

A new electronic measuring unit now available from Vacuumatic Ltd. of Harwich, Essex, will record precisely the length of paper or board as it is used from the reel during processing.

The unit is designed to provide printers, paper mills, and converters with an accurate and reliable system of quantity control. The equipment, which is accurate to ± 0.5 per cent, requires minimal maintenance and is based on a measuring wheel linked to CMOS electronic counters and LED visual display units.

The rotary measuring unit is mounted on an air bearing which creates virtually no friction and has the added advantage that it remains dust-free. This will ensure complete reliability and long service free running. The outer circumference of the wheel is specially treated so that when it does eventually wear, this will be easily identifiable by a change in the colour of the bearing surface.

A particular advantage of the Linear Measuring Unit is that it only measures paper and stops recording in the event of a web-break or equipment failure.

The CMOS counters have undergone extensive reliability testing. Incorporated in the design is the automatic facility to record exactly the length of each reel at the moment the auto-pasters affect a flying splice and this measurement remains displayed for later recording.

With the addition of the linear measuring unit to the comprehensive range of paper counting machines available from Vacuumatic, the company can now provide customers with equipment for measuring and controlling all supplies of cut and reeled paper.

## Smoke Detection System

Skylark Traders (P) Ltd. (315/317 Prospect Chambers, Dr. D.N. Road, Fort, Bombay 400001) markets a 100 per cent indigenous electronic smoke detection system made by M/s. Subraj Industrial Electronics.

The smoke detection system has the following additional advantages over the existing fire-alarm system: The system works on 100 percent indigenous and totally electronic circuitry and hence avoids usage of hazardous elements. The parts vulnerable to fire are placed in well-secure positions in the annuniciator panels. Consequently, the danger of fire damaging such parts hardly exists in the new system. This ensures smooth functioning even in the midst of a raging fire. When the fire occurs, sometimes the cable in the fire alarm system gets cut. Even otherwise, there are chances of accidental cuts in the wiring system. This renders the whole system totally inoperative and ineffective. To keep a check on this eventuality, the company devised a special method which regularly keeps a watch on such anomalies. While making smoke detectors, it is claimed, care has been taken to see that they do more functions than the other existing ones. As a result, apart from detecting hydrocarbon smoke, the company's detectors also detect other kinds of smoke.

### Static Ribbon Pattern Preventer

Uptron Shreetronic Ltd. joint sector undertaking with UP Electronics Corporation Ltd., has indigenously designed a static ribbon pattern preventer (RPP) using the state of art technique for preventing the formation of ribbon pattern on cone winders in textile industries.

The RPP can replace conventional electromechanical antipattern device. This new innovation can perform make and break operations of the order of 30 to 50 a minute. Malfunctioning, if any, is indicated on the front fascia. With built-in overvoltage, undervoltage, thermal over-load relay and single phasing preventer, protection is complete. A few of the advantages are: (i) prevention of ribbon pattern formation efficiently and reduction in yarn breakage; (ii) smooth and uniform winding without any flaw; hence increased production at warping and subsequent process stages; (iii) no moving parts; hence, no wear and tear; (iv) conveniently located adjustable finger-tip control for Off and On switching periods and (v) longer life and low power consumption.

The first few of this equipment are working satisfactorily in some cotton textile industries, which have already acclaimed it a money-saver, besides being efficient and faithful. In fact, it pays for itself in less than a year of service.

For more details write to: Uptron Shreetronix Ltd. 46,
Rajindernagar Industrial Estate, P.O. Mohannagar-201007,
Dist. Ghaziabad (UP)

## ENGINEERING EQUIPMENT

### Automatic Oil Expeller

The expeller is fitted with a three stage cooking kettle. It is compact in design and is fitted with self controlled meal inlet to prevent overflowing. It is also fitted with safety valve, pressure gauge, steam traps, steam valve and steam damping apparatus. The kettle requires 100-120 lbs. of process steam per hour at pressure of 60 lbs. per square inch to be supplied from separate boiler.

Power: The power required depends upon material being crushed and how well it has been cooked. Normal requirement for usual seeds is 70-75 BHP.

Lubrication: The expeller is fitted with self-lubricating reduction gear box; main gears are steel fabricated and tempered, they also run in its own oil bath thus ensuring long life to all these gears. Stuffer lubricators are fitted on other bearings as standard fittings. High pressure grease gun lubrication can be fitted if desired at an extra cost.

Capacity: It vsries from seed and also whether the expeller is being used for first or second crushing. The efficient cooking, preliminary crushing and large capacity chamber box in this expeller gives the following crushing capacity of 24 hour working.

| | |
|---|---|
| Copra first crushing | 25 - 30 tons |
| Copra second crushing | 20 - 22 tons |
| Ground nut | 18 - 20 tons |
| Cotton seed | 18 - 20 tons |

The oil left in final cake is about 6.7%

Motor drive arrangement: This expeller is usually supplied with belt drive arrangement. If motorised unit is desired, the same can be supplied at an extra cost.

Durability: All parts subject to heavy wear and tear such as worms cage bars cone points are made from case hardening steel (special alloy steel) and properly heat treated to give long life, high capacity and low maintenance cost. Standard equipment includes spanners, pressure gauge, steam traps etc.

The expeller can be used for the extraction of oil from copra, groundnuts, cotton seed, castor; mowrah, mustard seed, rapeseed, linseed etc.

Further details from: Alfa Engineering Works, 8, Anees
Chambers Annexe, Carnac Road
P.B. No. 1284, Bombay - 400 001.

## Cutting Machine

Advani-Oerlikon has introduced for the first time, multiwire straightening and cutting machines.

They are one of the fastest operating machines available. This machine can be used to straighten and cut ferrous and non-ferrous wires. These wires may be up to a maximum dia.

of 2 mm. As the machine is completely automatic, all that the operator has to do is to place the wire spools and feed the wires at the first stage.

After that, the machine takes over.

Application areas: semiconductor products, electronic devices, lamp industry and various types of precision wire products.

Operation:

a) Wire feeding: The wires to be cut and accepted on spools from where they are fed to the sliding guide which pulls the wires automatically. This feeding is through a wire straightening device.

b) Wire straightening: This is carried out in two axes-horizontal straightening and vertical straightening. The wire straightening arrangement has a revolving roller. It prevents damage to wire coating such as insulation.

c) Lenght adjustment: The sliding guide can be adjusted to pull the wires in required lengths up to 100 mm within an accuracy of 0.05 mm.

d) Wire forming: A special device can be attached to the machine to enable bending or flattening of the wire end before cutting.

Further details can be had from: Advani Oerlikon Limited, P.B. Box 1546, Bombay 400 023.

## Pillar Drilling Machine

Pillar drilling machine type D40, from Hindustan Machine Tools, features optimum utilisation of power, conveniently grouped controls, and rigid construction using high grade meehanite castings. Speed selection is through shifting gear and selector switch. Four feed rates in the range of 0.1 to 0.28 mm/revolution are available.

Feed selection is through a single lever. There is automatic depth tripping to a present value on the scale and overload protection of the feed drive through a safety clutch. Spindle quill has close sliding fit in drill head bore achieved by honing the main spindle mounted on precision radial and thrust ball bearings. Circular column is ground to precision surface finish. Coordinate setting is through rotating the table and swinging the knee. There is automatic lubrication of the drill head. The main motor is protected by a bimetallic relay against overloads.

Drilling in steel/cast iron is upto 45/50 mm. Quill traverse is 200 mm. Speed range is 80 to 1,440 rpm and the table diameter is 500 mm. The main motor is rated for 1.5/ 2.2 kW.

## MACHINE TOOLS AND ACCESSORIES

### Antifriction Bearings

Antifriction bearings used in precision machine tools demand higher accuracies than the commercial available accuracy class. The entire demand for precision grade bearings at present is met by import alone. Recnetly M/s. Mysore Kirloskar Limited, Harihar have started offering certain sizes of precision antifriction bearings suitable for machine tools and similar other applications. This development in the field of import substitution by M/s. Mysore Kirloskar Limited has been awarded the FIE Foundations Award during IMTEX 70 for precision angular contact bearings.

The bearings are claimed to permit precision running accuracy and negligible deflection under fluctuating loads. Accuracy of rolling elements and trackways has been carefully controlled and the overall accuracy of the assembled bearing is ensured. High quality hardened chromium alloy steel is used for the bearings and non-ferrous materials for cages. The standard bearings are manufactured to class 5(P5) accuracy but bearings to any other accuracies to suit specific requirements can also be supplied. Split roller bearings have also been introduced. More details can be had from the manufacturers.

### Automatic Back Spot Facing Tool

Conventional rear spot facing or champering is often cumbersome and time-consuming operation. PRECITEC's Automatic Bank Spot Facing Tool comes handy and convenient for this operation. The back spot facing tool can be used in the same manner as the conventional drill or the present boring tools without the intervention or adjustments by the operator.

For carrying out rear spot facing, the tool is rotated in reverse direction, inserted into the drilled or reamed hole and then rotated in the cutting direction. Then the folded wing opens up ready for facing. After completing the cutting operation, the tool is again rotated in reverse direction and is withdrawn.

The convenience and quickness in spot facing with automatic back spot facer makes it extremely useful and economical in proudction shops due to the following specific advantages:

- Production time is normally reduced by 70% and in some cases up to 90%
- Operator fatigue is eliminated
- Use of carbide inserts permits all inherent advantages of insert toolings
- Product design is simplified as surface not accessible to conventional back spot facing, can now be faced using this tool
- Adaptable to NC automatic and semi-automatic machines.

The tools are manufactured under licence from Central Machine Tools Institute, Bangalore to a wide range of standard holes and spot facing diameters; Also manufactured to customers specific size requirements and operations.

Enquiries to: Sharma & Sons, 599 2nd Stage I Block
Rajajinagar
Bangalore 560 010.

## Cylinder Head Drilling Machine

Escol has developed a machine for simultaneous drilling of 29 holes in cylinder heads which are made of grade 25 cast iron. The machine is fitted with a cluster plate which provides locating for 29 spindles. Slip spindle cartridges are provided and they can be quickly adjusted to drill a set of 16 holes in the first operation and a set of 13 holes in the second operation. A quick clamping jig is provided to locate and clamp the job, the same jig being used for both operations.

In the first operation, the holes are drilled through the 3-inch thick casting. This is done by an automatic wood packing cycle with the drill retracting and restarting cycle after every inch. of drilling. In the second operation, 13 holes are drilled to a preset depth, also on an automatic cycle.

The machine is fitted with appropriate controls to provide fast approach and fast retracting and precise control of drilling depth. The table is moved up under hydraulic power, ensuring a smooth movement. The cycle time for both operations is 4-1/2 minutes.

For details contact: Escol Electromech Private Limited
Kripalani Estate, Saki-Vihar Lake Road, Bombay-400072.

## Pipe Lathe

Spindle bores covering the most common diameters of pipe used in the oil industry, and a wide range of spindle speeds, are provided by a pipe lathe developed by a British machine tool builder.

The Model 30P pipe lathe is available with a spindle bore of either 310 mm (12¼ in) or 355 mm (14 in). It has 18 spindle speeds, forward and reverse, from 2.25 rev/min to 355 rev/min. The thread range is 1.56 threads/in and the pitch range 0.5-20 mm.

Swing over the bed is 810 mm (32 in) and over the cross slide 495 mm (19½ in). Centre distances range from 1.83 m (72 in) to 4.27 m (168 in) in increments of 305 mm (12 in).

The spindle is driven through a multiplate clutch, pneumatically operated. Braking is magnetic for effective control of the combined mass of the spindle's two chucks and the workpiece. Full interlocking of clutch and brake prevents spindle reversal before braking.

A windowed canopy, which can be slid into any position along the bed length, protects the operator.

The lathe is available with a range of auxiliary equipment, including steadies, hydraulic copying equipment and high-speed threading equipment.

Manufacturers: Dean Smith & Grace Ltd.
P.B. Box 15
Worth Valley Works
Pitt Street
Keighley
Yorkshire
England.

Agents: : Heally & Gresham (India) Pvt. Ltd.
W-112 A
Greater Kailash
New Delhi.

# Industry Roundup

This section highlights policies and procedures, guidelines the present status and future prospects in certain industries as well as the latest available data in respect of such industries.

## VITAMIN INDUSTRY

Vitamins are organic substances required in relatively small amounts, for the proper functioning of the animal organism. They (or in some cases their immediate precursors) must be present in the food. Lack of vitamins causes certain deficiency diseases, curable by administration of the appropriate vitamin; partial lack may cause minor disturbances or less well-defined ill-health. Some vitamins have a valuable therapeutic action when given in relatively large doses. As they were discovered, they were distinguished by letters A,B,C etc. but they were later given names as their chemical nature was determined. There are two main groups: (1) fat soluble and (2) water soluble. The first group of vitamins are associated with fats, soluble in fats and the usual fat solvents. They contain only carbon, hydrogen and oxygen (Vitamin A,D,E and K). The second group of vitamins, most of them, contain nitrogen (Vitamin C and the vitamin B-complex). Several of the latter group are associated with enzymes concerned in oxidation - reduction processes.

### Vitamin A (Axerophthol)

The richest natural sources are the liver oils of fish (halibut, cod, etc.) but valuable sources of the vitamin and its precursors are milk, butter, eggs and various vegetables. The daily requirement of the normal adult is not known with certainty but is believed to be at least one mg. Lack of vitamin A causes night blindness and in more severe cases, xerophthalmia, excessive keratinization of other epithelia (and hence, perhaps, increased susceptibility to infection) and in the young, deficient growth.

The mass-deficiency of vitamin A in our country is largely due to pitiably low daily consumption of vegetable oil, animal fats, milk and fresh vegetables. An imbalanced grain-based diet of refined wheat or rice is evidently incapable of supplying the minimum daily requirement of vitamin A. The Recommended Daily Allowance (RDA) of vitamin A according to modern nutrition is 400 IU.

In many countries of Europe and USA milk is enriched with vitamin A and D for better public health.

## Vitamin B Complex

It is a group of water-soluble vitamins which includes vitamin B1, B2, B6, B12, niacin, pantothenic acid, biotin and folic acid.

## Vitamin B1 and Vitamin B2

### Vitamin B1 (Aneurin, thiamin)

The richest natural sources are yeast and the germs of cereals, but it is present in most foods. The minimum daily requirement is about one mg. It is essential for the proper metabolism of carbohydrate (of special importance to brain and nerve tissue). It is a somewhat heat labile watersoluble vitamin. The complete deprivation of vitamin B1 causes beri-beri, while partial lack results in peripheral neuritis and cardiac abnormalities.

### Vitamin B2 (riboflavin)

Lack of vitamin B2 causes failure of growth and, in man, a syndrome characterized by thickening and cracking of the lips and by corneal lesions. The daily requirement is believed to be about one to three mg.

In many modern nutrition conscious countries, bread and cereals are enriched, since many years, by fortification with vitamin B1, B2 and Niacinamide. For the improvement of public health, such enrichment of flour is a long awaited step in our poverty - stricken country to protect the health of the masses. A 'Janata Bread' enriched with vitamins B1, B2 and niacinamide will be a step in the best interests of public health in India.

The progressive use of polished rice in India has deprived countless millions of vitamins B1, B2 and niacinamide and other vitamins. Polished rice and white flour are not natural foods, in that the germs of the grains have been removed. What is retained is largely the energy store of the natural grain with no substantial part of the nutritional chain of life retained. No food prepared from white flour or white rice (and there are many) are natural foods. Many foods are processed or cooked in such a way (often involving heat treatment like frying) that the natural food value is lost. These are no longer natural foods.

Fortunately, the 'village' India is not consuming as yet much of refined and unnatural foods and therefore has somehow escaped nutritional deficiencies of B1, B2 and B6. The poorest segment of the urban poor surviving on bread and polished rice are however highly susceptible to such deficiencies.

## Vitamin B6 (Pyridoxine, pyridoxal phosphate, pyridoxamine)

Vitamin B6 is a water-soluble member of the vitamin B complex. It exists in 3 forms and often occurs in nature as a mixture of these 3 forms. This family was originally called pyridoxine, but more recently has been called pyridoxol-currently bio-chemists favour the term pyridoxol, while nutritionists favour the term pyridoxine. The three forms of vitamin B6 are pyridoxal, pyridoxol and pyridoximine. Good sources for vitamin B6 are liver hain, lima beans and corn. Evidently all these sources are scarce to meet the requirement of our huge population of 650 millions.

Vitamin B6 is an essential vitamin involved in protein, fat and sugar metabolism and is intimately concerned with the metabolism of the central nervous system. An average Indian diet is deficient in this vitamin and there is a crying need for its indigenous production. As yet there is no indigenous producer on the horizon for this vitamin, although the government has set a target of 100 tonnes for this vitamin by 1983 to 1984. It is very much doubtful whether even 50 tonnes will be produced in the country by 1983 to 1984. It is now reported that IDPL (Hyderabad) will be manufacturing this vitamin in the near future. The National Chemical Laboratory (NCL), Poona, has also claimed that it has developed a process for the commercial production of vitamin B6 in 1970. However, as yet, the process has not been commercialized.

## Vitamin B12 (Cyanocobalamin)

It is a red crystalline substance isolated from liver and other natural sources. It contains cobalt and phsophorus. The nucleus (corrin) was synthesized in 1964. Pernicious anaemia results from defective secretion of intrinsic factor without which ingested vitamin B12 cannot be absorbed.

Vitamin B12 is a water-soluble member of the vitamin B complex. Human requirements are in the microgram range, which is lower than the milligram range of the other B vitamins. Good sources unfortunately are animal tissues particularly liver tissues, wheat germ. The RDA is hardly 3 mg per day, but vegetarian or grain-based diet is perennially deficient in vitamin B12. It is the deficiency of this vitamin in Indian diet, which is largely responsible for pernicious anaenmia so widely prevalent in India, particularly in pregnant women and children.

The wide prevalence of pernicious anaemia in the country coupled with vegetarian diet makes it imperative that we should have an indigenous production of 1,000 kg. by 1983 to 1984. At present it is doubtful if we will be able to achieve even planned production capacity of 600 kg. by 1983 to 1984.

## Pantothenic Acid

It is also a water-soluble member of the B-complex group, Good sources are whole-grain cereals, legumes and animal tissues. The vitamin-acid is required for proper functioning of adrenal gland and is required to fight stress. Recently it has found uses in improving mental processes and to correct certain enzyme deficiency. Its RDA for humans is not yet certain, but many estimate it around 5 mg. to 10 mg. per day. The preferred form is calcium pantothenate.

As yet panthenol/pantothenates are not manufactured in India, but it is reported that IDPL may take up the manufacture in future.

## Vitamin C(Ascorbic Acid)

It is a white crystalline substance, stable when dry but very easily oxidised in solution, especially in neutral or alkaline solution. Almost complete lack of Vitamin C leads ultimately to scurvy partial lack leads to vague ill-health.

Vitamin C is a water-soluble vitamin with no known toxicity. It is looked upon by some researchers as being more than a vitamin as being actually a lower metabolite missing in humans as a result of a genetic accident. Good sources are citrus fruits, tomatoes, strawberries, cranberries, potatoes and raw greens. It is easily destroyed by autoxidation during cooking. All above sources of the vitamin C are inadequate to meet the daily requirement (RDA 45 mg) in India. It is required in conjunction with folic acid and vitamin B12 to cure pernicious anaemia.

India's requirement for vitamin C is enormous. At present there are already four parties licensed to manufacture - Sarabhai M Chemicals (240 tonnes/year), Jayant vitamins Pvt. Ltd., (240 tonnes/year), Hindustan Antibiotics (125 tonnes/year) Maize products (240 to 500 tonnes).

Inspite of indigenous manufacturers the country is incapable of meeting the demand of the population. The government has planned for a target of production at 1800 tonnes/year by 1983 to 1984.

The know-how under which vitamin C is produced in India is an outdated know-how with poor yields, vis-a-vis the process followed in USA, Japan and West Germany. The production of vitamin C in 1978 in India was hardly around 400 tonnes, although the total licensed capacity issued by the Government is over 1,000 tonnes.

Even if production of vitamin C reaches barely 1,000 tonnes per annum in the coming years, it will make India the world's 5th largest producer of the vitamin. At present the leading vitamin C producers in the World are USA, Japan, West Germany, Switzerland and the UK. With ample agricultural resources of corn starch, India has the potential to become third biggest producer of vitamin C in the near future, but even then the per capita availability of this essential vitamin will be insufficient to meet the minimum level of modern nutrition for optimum public health standards. Such is the pressure of population in India.

The biggest multinational firm in production of vitamin C is Hoffmann LaRoche. This world giant in the production of vitamin C possesses the latest know-how with optimum percentage yield. The world's largest plant of Hoffmann La Roche in Belveders, New Jersey, USA claims a capacity of 10,000 tonnes per year, with fully computerized production employing hardly 20 to 30 persons. Roche also have manufacturing facilities for vitamin C production in the UK and Switzerland.

## Vitamin D

The fat-soluble, anti-rachitic vitamin probably acts by regulating the absorption of calcium and phosphate from the intenstine. Calciferol (D2) is usually prepared artificially from erogosterol, cholecalciferol D3 appears to be the commonest natural vitamin. The richest natural sources of vitamin D are the fish liver oil, but it is present, in smaller amounts, in most animal fats. The daily requirement of the growing child and of the pregnant or lactating woman is believed to be about 12.5 micrograms of calciferol, for the normal adult 2.5 micrograms is adequate.

Due to abundant sunlight, the Indian masses do not suffer from vitamin D deficiency, since provitamin D from vegetables is converted in the body to vitamin D by the action of sunlight on the skin. The nature's bounty therefore enables our poor masses to get their RDA of vitamin D of 400 IU. Therefore no urgent priority is needed for indigenous production.

Incidentally vitamin D occurs in two forms. Vitamin D2 (ergocalciferol or irradiated ergosterol) and vitamin D3 (cholecalciferol). Both are identical in physiological action. As the raw material for vitamin D3 is easily available in India recently the Government of India has imposed restrictions on the production of vitamin D2 in India.

## Vitamin E (Tocopherol)

It is a fat-soluble vitamin. The deficiency causes, in the females, in some species at least, inability to reproduce, the foetus dying and being resorbed. In the males, complete deprivation of the vitamin ultimately produces degenerative changes and permanent sterility. Other symptoms of deficiency, in some species, are muscular dystrophy and necrosis of the liver. Human requirements are not known.

Vitamin E activity is possessed by a family of chemicals called tocopherols. The prime member is alphatocopherol and lesser members of the family are beta, gamma, and delta-tocopherols. Good sources are whole grains, wheat germ, nuts, legumes, eggs and sprouts - all of which are deficient in an average Indian diet and more so in a vegetarian diet.

Vitamin E is vital for normal reproduction. Recently it has come into limelight for its use in geriatrics. It appears to slow aging process, and reduces the incidence of cancer and heart disease. Therefore, with increase in lifespan and heavy urbanization, there will be greater need for vitamin E in our country. There is only one producer of this vitamin at present in India, namely E. Merck.

## Vitamin K

It is a fat-soluble vitamin required for the production of proturombine and therefore for normal blood coagulability. Vitamin K1(phylloquinone)found most abundantly in the green leaves of plants, is 3-phytyl-2-methyl-1, 4-napthoquinone, vitamin K2, formed by putrefactive bacteria, is 3-difarnesyl-2-methyl-1, 4-napthoquinone.

The production of synthetic vitamins in India is of recent origin. Before 1950, there was virtually no production of synthetic vitamins in the country. It was only after 1950 with progress towards production of basic drugs that the attention of phrmaceutical industry was drawn towards synthetic vitamins. With pitiably low standards of nutrition and public health in the country, it is easy to realize the great scope for the indigenous production of 15 major essential vitamins viz: Vitamin A; Vitamin B, (HCl & mononitrate) vitamin B2 (Riboflavene-5-phos); vitamin B6 (pyridoxine HCl); vitamin B12 (Cyanocobalamin); Folic Acid; Nicotinamide; Nicotinic Acid/Amide; panthenol/pantothenates; vitamin C; vitamin D3; vitamin E; vitamin K; vitamin P (Rutin); Choline Chloride etc.

The indigenous production of some vitamins during 1977-78 and 1978-79 are as follows:

| Vitamin | Unit | 1977-78 | 1978-79 |
|---|---|---|---|
| Vitamin A | MMU | 50.19 | 62.21 |
| Vitamin B1 | Tonnes | 34.92 | 25.00 |
| Vitamin B2 | Tonnes | 7.80 | 5.42 |
| Vitamin B12 | Kgs. | 162.14 | 161.00 |
| Vitamin C | Tonnes | 642.48 | 723.00 |

So far much progress has been achieved and indigenous production of as many as 12 synthetic vitamins out of 15 major vitamins has commenced in the country.

The present consumption of eggs, meats, vegetables and fruits in India is at a pitiably low level. The masses in India live virtually on grain diet consisting mostly of rice and wheat with a pat of pulses (dal) and milk. This makes India practically a grain-eating country. Religion-based vegetarianism on the top of it has deprived countless millions from taking advantage of animal proteins available in the country. The per capita availability of proteins and vitamins in an average Indian diet is the lowest in the World. As a result the country lives on perhaps the poorest diet in the world in the opinion of the world's leading nutritionists, with widespread prevalence of multiple deficiencies of protein as well as vitamins.

The most common deficiencies of vitamins are for vitamin A, vitamin C, nicotinamide and vitamin B12 in India. According to many foreign nutritionists, Indians suffer from incipient anaemia on a vest scale seldom or never seen in any other country. To correct these deficiencies of vitamin A and vitamin B12, the government of India is very keen towards early production of both these vitamins on a big scale. Unfortunately vitamin A technology is a world monopoly controlled by three multinationals, namely Hoffmann La Roche, BASF (W.Germany) and Takeda (Japan). Therefore vitamin A production has proved impossible without foreign collaboration. A big project, Kerala Drugs & Pharmaceuticals - in the public sector - in collaboration with Takeda Chemicals of Japan is coming up in Kerala for indigenous production of vitamin A, from local lemongrass oil available readily in Kerala. This project will enable our country to minimize the mass-deficiency of this essential vitamin in the near future

| Vitamins | Companies |
|---|---|
| Vitamin A | Kerala Drugs & Pharmaceutical (Under planning)<br>Glaxo Laboratories, Roche. |
| Vitamin B1<br>Vitamin B6<br>(under planning) | IDPL |
| Folic Acid<br>Vitamin B12 | Alembic Chemicals, Merck, Sharpe & Dohme, Themies Chemicals Ltd. |
| Vitamin D3 | Glaxo Laboratories, Roche<br>Duphar Interfran |
| Vitamin C | Sarabhai M Chemicals, Jayant Vitamins, Hindustan Autibiotics |
| Vitamin E | E. Merck (India) |
| Vitamin P (Rutin)<br>cholines | Hicco, Sarabhai M. Chemicals |
| Nicotinamide<br>(Nicotinic Acid) | Chemo Pharma, gufic (pvt.) Ltd.<br>Cipla Lab, Suneeta Laboratories, several other companies |
| Vitamin K | Cipla |

Despite indigenous production of 12 vitamins out of 15 major vitamins have been well established, substantial amount of synthetic vitamins are still imported into the country each year. For vitamin B6 and panthenol/pamtothenates we are totally dependent on imports. Unfortunately no exact statistics are available in the imports, except those published by the Government's commercial intelligence bureau. These Government Statistics surprisingly do not provide any details on the imports of panthenol/pantothenates.

As per the available statistics of the Government of India, substantial amounts of synthetic vitamins have been imported into India in 1976-77, 977-78 and 1978-79.

| Sl. No. | Vitamins | 1976-77 |  | 1977-78 |  | 1978-79 |  |
|---|---|---|---|---|---|---|---|
|  |  | Quantity in kg. | Value in Rs | Quantity in kg. | Value in Rs | Quantity in kg. | Value in Rs |
| 1. | Cholines | 6269 | 138481 | 3019 | 118499 |  |  |
| 2. | Folic Acid | 70 | 40890 | 2899 | 944147 | 1120 | 62052 |
| 3. | Vitamin A | 4295 | 878708 | 23161 | 3532184 | 18769 | 429443 |
| 4. | Vitamin B1 | 9960 | 1397740 | 4000 | 873773 | 24425 | 5871172 |
| 5. | Vitamin B2 | 11250 | 3352668 | 10000 | 3799733 | 17353 | 6695830 |
| 6. | Vitamin B6 | 135000 | 3570072 | 22806 | 6883653 | 20286 | 8976672 |
| 7. | Vitamin B12 | - | - | 342 | 1885694 | 514 | 1444942 |
| 8. | Vitamin C | 25 | 1584 | 100 | 7553 | 15963 | 1172685 |
| 9. | Vitamin D | 133 | 183592 | 72 | 342125 | 3 | 30410 |
| 10. | Vitamin E | 913 | 268850 | 1522 | 285453 | 2883 | 505641 |
| 11. | Vitamin K | 836 | 115900 | 248 | 77630 | 184 | 147530 |
| 12. | Vitamin B.Complex | - | - | 922 | 9988 | 770 | 134181 |
| 13. | Others | - | - | 93801 | 22560220 | 175283 | 36083330 |

To decrease our country's dependence cn imports for essential vitamins, the Government has drawn an ambitious plan for expansion of indigenous vitamin production by 1983-84.

| Vitamin | Unit | Capacity approved (covered by existing letter of intent/industrial license) | Earlier target for 1978-79 (V plan) | Estimated Demand 1982-83 | Target for 1983-84 ( VI plan) | Additional Capacity to be approved for 1982-83 targets |
|---|---|---|---|---|---|---|
| Vitamin A | MMU | 110 | 80 | 130 | 150 | 20 |
| Vitamin B1 | MT | 120 | 100 | 180 | 200 | 60 |
| Vitamin B2 | MT | 24 | 24 | 50 | 48 | 26 |
| Vitamin B6 | MT | 70 | 50 | 70 | 100 | - |
| Vitamin B12 | kg. | 238.2 | 300 | 380 | 600 | 141.8 |
| Folic Acid | MT | 7.5 | 7.5 | 9 | 15 | 1.5 |
| Panthenol/ pantothenates | MT | 45 | 60 | 40 | 90 | - |
| Vitamin C | MT | 1280 | 900 | 1600 | 1800 | 320 |
| Vitamin D3 | kg | 3000 | 1.0 (tonne) | 200 | 2.0 (tonnes) | - |
| Vitamin K | kg | 3000 | 1140 | 2000 | 2280 | - |
| Rutin (Vitamin P) | MT | 5 | 7.00 | 8 | 10 | 3 |

Exports of vitamins during 1975-76, 1976-77 and 1977-78 are as follows:

| Vitamin | 1975-76 | | 1976-77 | | 1977-78 | |
|---|---|---|---|---|---|---|
| | Quantity in kg | Value in Rs | Quantity in kg | Value in Rs | Quantity in kg. | Value in Rs |
| Folic Acid | - | - | 441 | 64684 | 1777 | .12315 |
| Vatimin A | - | - | 75 | 8466 | 84 | 11662 |
| Vitamin B1 | 5 | 650 | 180 | 5500 | - | - |
| Vitamin B2 | 68 | 3500 | - | - | - | 11363 |
| Vitamin B6 | 16 | 691 | - | - | 5 | 500 |
| Vitamin B12 | - | - | - | - | - | 31035 |
| Vitamin C | 212 | 19558 | 5136 | 203757 | 161 | 22297 |
| Vatimin B. Complex | 947 | 39200 | 10085 | 382476 | 9596 | 299143 |
| Cholines | - | - | - | - | 42 | 7665 |
| Vitamin E | - | - | - | - | 400 | 5802 |
| Vitamin K | - | - | - | - | 5 | 24800 |
| Others | - | - | - | - | 22937 | 778531 |

In the guidelines for the industries for year 1979-80 issued by the Government of India, certain Vitamins are kept open for licensing, some for public sector and some for Indian sector. These are given as

| Public Sector | Indian Sector | Open for all sectors including foreign |
|---|---|---|
| Vitamin B1 | Vitamin C | Vitamin A |
| Vitamin B2 | -- | Vitamin B2 |
| Folic Acid | | Vitamin BC |
| | | VitaminD3 |
| | | Vitamin K |
| | | Vitamin P |

(KSDR)

# Current Technical Literature

Copies of articles/documents listed in this section are available on payment of Rs 5/- for the first 5 pages or part thereof and Re. 1/- for every subsequent page of the photo copy or xerox copy of the article/document. While placing the order, please mention the CTL number of the SENDOC Bulletin.

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# CURRENT TECHNICAL LITERATURE

## RESOURCES

### Energy Sources

196. ----: Gobar gas plants: cost of neglect. Chemical Weekly, 1981, 26(21), 86.

Explains the constraints in popularising the gobar gas plants among the rural areas. (MSR)

197. NEWBY, W.M.: Combustion technology. Part I. An overview of combustion technology available to the pulp and paper industry. Paper Trade Journal, 1980, 164(9), 30-44.

The author reviews the various types of combustion systems and auxiliary systems for burning solid, wood-derived fuels to generate boiler steam. Advantages and disadvantages of the various types are outlined, along with application limitations such as capacity and fuel characteristics.

198. PATWARDHAN, M.S.: Energy crisis-challenge for the eighties. Chemical Weekly, 1980, (Annual Member), 202-209.

Reviews the world energy supply & demand position. Presents the Indian energy scene. Analyses the scope for reducing energy demand without materially affecting economic growth. (MSR)

199. SASTRY, M.S. & NANDAKISHORE, K.: Renewable resources, feed-stocks and energy. Chemical Weekly, 1980 (Annual number), 177-179.

Outlines various methods of conversion of energy resources where sun has direct or indirect influence. (MSR)

200. THANVI, K.P & NAHAR, N.M.: A low cost solar water heater-cum-solar still. Research and Industry, 1980, 25(2), 74-77.

The design and performance of a newly developed solar water heater-cum-solar still are described. The device can be used for getting hot water and distilled water simultaneously. Its efficiency as a solar water heater is 57.9% and as a solar still 47.5%. When used as solar water heater and solar still simultaneously, the efficiency is 72.8%. The total cost of fabrication of the system is about ₨ 500 with a payback period of 4-6 months only.

## Waste Utilisation

201. Rice husk - source of energy and silicate products. Chemical Weekly, 1980, 26(11), 79-80.

Examines the properties of rice husk and highlights its utilization pattern in manufacturing a variety of products. (MSR)

202. ----: Utilising residues. Chemical Weekly, 1980, 26(7), 46-47.

Emphasises the need for effective utilization of agricultural residues. Highlights the main bottlenecks in commercial exploitation of these residues and suggests proper planning. (MSR)

## PAPER PULP AND ITS PRODUCTS

203. BALDWIN, E.J. & DENNISON, S.R.: Pigment coating in Western Europe. TAPPI, 1980, 63(3), 57-60.

A review is presented of a number of aspects of pigment coating in Western Europe. A brief discussion of market growth is followed by a survey of coated paper grades. The major portion of the paper deals with the properties and application of pigments, and the technology used for making coated papers. A projection of future trends is included.

204. CARR, M.E et al: Chlorinated carbamoylethyl starch for wet-rub resistant paper coatings. TAPPI, 1980, 63(3), 105-108.

205. FOELKELCE, B & ZVINAKEVICIUS, C.: Hardwood pulping in Brazil. TAPPI, 1980, 63(3), 39-42.

A general overview of the pulping of hardwoods in Brazil is given, dealing mainly with the production of bleached kraft pulps from Eucalyptus and Gmelina woods. Wood and fibre properties, pulping, bleaching and pulp qualities are discussed, and some of the advantages of using thesetwo types of fibres are indicated.

206. GOTTSCHING, L.: New developments in paper making in Western Europe. TAPPI, 1980, 63(3), 50-54.

In spite of considerable technical progress in the paper industry, the profits have been negligible due to the exorbitant increase in energy costs, decrease in the supply of wood resources and environmental pollution measures combined with slower economic growth. These restrictions have to be compensated for by different measures, such as increases in pulp yield, extended wastepaper recycling increased utilization of fillers and additives, decrease in basis weight, and improvement of productivity, combined with energy saving and effluent treatment. The development in Europe on mechanical pulping, waste paper treatment and research and development is highlighted.

207. MALETSKY, A.: Envelop adhesives: Dextrine to hot melt. Paper Film & Foil Converter, 1979, [illegible], 68, 70, 72.

Focusses upon the principal forms of envelop adhesives, their chemical structure, properties, advantages or disadvantages, with special emphasis on front seal gums. (BS)

CHEMICAL INDUSTRIES

208. ----: Chemical industry - Present and future. Chemical Weekly, 1980, 26(8), 93-98.

A discussion on the growth and development of chemical industry in India is presented. Estimated capacity and production of some important chemical for the years of 1977-78, 1982-83 and 1987-88 have been tabulated. Production of selected industries and investment and value of production in chemical industry are graphically represented. (MSR)

209. ----: Economic survey of chemical industry and review on technological management strategy. Chemical Weekly, 1980, 26(8), 87-90.

Discusses the problems faced by the Western chemical industry in the 1980's (MSR)

210. ----: Economic survey of chemical industry and review on technological management strategy. Chemical Weekly, 1980, 26(9), 89-91.

Discusses the future of the chemical industry and the role of technological innovation and research and development (MSR).

211. ----: From borrowed technology to own technology in world of chemicals. Chemical Weekly, 1980, 26( [illegible] 97-101, 103-1 [illegible].

Explains how Japan is planning to develop technologies of their own. Gives a list of chemical-related technologies developed in Japan and export of major technologies invented in Japan (MSR).

212. CHOUDHARY, C & SINHA, R.K.: Materials for nitric acid plant, Chemical Age of India,1980,31(7), 735-738.

Gives the flow chart for the manufacture of nitric acid and materials of construction of plant. (BS)

213. PANCHARATNAM, S et al: Process alternatives for alkali bromides. Chemical Age of India, 1980, 15(12) 31-35.

Discusses the processes based on hydrobromic acid, iron bromide and bromate reduction for the manufacture of alkali bromides. Compares the advantages and disadvantages of each process together with economic analysis. (BS)

214. SASTRY, S.L.: Fine chemicals. Chemical Weekly, 1980, Annual Number, 199-201.

Deals with some aspects of the chemistry and technology of some acetylene and furan based chemicals viz., vinyl ethers, other vinyl compounds, furfural. (MSR)

215. SUBRAMANYAM, B.S.: Failure of plant equipment to perform as per design conditions. Reasons and corrective steps. Chemical Age of India. 1980, 31(7), 739-740.

Enumerates the factors to be considered while designing a chemical plant or individual equipment, different types of common failures in plant performance and finally gives the steps to be taken to improve performance. (BS)

## PLASTICS

216. ----: Alphabetical listing of material suppliers, machinery manufacturers, and service and testing companies. Plastics Design & Processing, 1981, 20(10), 127-135.

This section is an alphabetical listing of manufacturers, suppliers and service companies involved in resins, fillers, reinforcements, molds, tools and suppliers.

217. ----: Automotive Plastics: New markets from new processes. Indian Rubber and Plastics Age, 1980, 16(6), 23-29.

218. ----: The plastics desk manual. Plastics Design & Processing, 1981, 20(10), 2-124.

Terms, concepts, definitions, materials, test instruments, parts, components, production equipment and machines, tools accessories, and supplies used in the plastics manufacturing industry are described and explained, all in alphabetical order. Names of suppliers of the products involved are listed immediately after product descriptions.

219. ----: Polypropylene: A promising commodity for new ventures. Chemical Weekly, 1980, 26(11), 77, 78,80.

Reviews the global and Indian scene for the polypropylene market. Tabulates India's imports, production and estimated demand of polypropylene. Presents the consumption pattern of polypropylene in India and abroad. (MSR)

220. HOLZAMANN, R.: The development of blow moulding from the beginnings to the present day. Plastics News, 1980, 10(9), 41-48.

221. VARGHESE, K.A.T.: Blow moulding - mould design. Plastics News, 1980, 10(8), 45-49, 51.

Briefly discusses about materials for mould construction, mould cooling, mould parting line and inserts, welding edges and pinchoff arrangements, mould cavity and recommendations for mould design (KSDR).

## LEATHER INDUSTRY

222. ----: Science and technology of leather manufactue. Leather Markets, 1980, 10(4), 27-32.

223. DORAISWAMY, B. et al: Prospects of myrobalan tanning. Leather Science, 1980, 27(9), 296-301.

In view of the steep rise in prices of wattle and chrome extracts, one has to examine the possibility of effective utilisation of the myrobalan in the tanning industry. The advantages and disadvantages of using myrobalan at various stages of leather production is well known to tanners. In conjunction with syntans or other tanning agents, myrobalan can be used as the main tanning agent to produce a variety of leathers including finished leathers for leathergoods. Possibly, myrobalan can be used as a basic material for producing certain types of syntans.

224. KHANNA, J.K et al: Bag tanning - An alternative development model. Leather Science, 1980, 27(9), 291-295.

A typical process followed for bag tanning and pit tanning sole leather is given in detail. Some pros and cons of bag tanned leather and pit tanned leather are discussed. Utilisation of bag tanned leather for a variety of finished leathers which may be converted into certain end products has been spelt out. A comparative statement of price is also given.

225. PARTHASARATHY, K & OLIVANNAN, M.S.: Process for the manufacture of nappa garment leathers from wet salted cow hides. Leather Markets, 1980, 10(4),21-23.

226. SINHA, P.K et al: Suede garment leathers from wet salted goat skins without using lime and sulphide. Leather Science, 1980, 27(9), 305-307.

227. VENGAN, R & KRISHNASWAMY, T.: Role of information in leather industry - trends. Leather Processing, 1980, 4(4), 23-30.

Brings out the role of information in leather industry. Gives the statistics of available encyclopaedias, glossaries and dictionaries, handbooks, directories and year books, reports and surveys, periodicals, patents standards and specifications, bibliographies and statistical information sources. Highlights the development of trade and R & D activities. Also lists out the abstracting and indexing services for leather and related subjects. (BS)

## MECHANICAL ENGINEERING

228. ----: An industrial policy for the growth of the machine tool industry in the sixth plan period. Engineering World, 1980, (12), 19-23.

Gives the memoranda submitted, by the Indian Machine Tool Manufacturers' Association regarding industrial policy for the growth of the machine tool industry in the sixth plan period. (KLR)

229. ----: New technology improves pressbrake operation and utilisation. Sheet Metal Industries, 1980, 57(9), 796-800.

Describes an example of the way in which a new automatic back-guage system has been introduced to improve pressbrake productivity. (MVS)

230. BHATTACHARJEE H.: Selection of machine tools. Machine Building Industry, 1979, 18(2), 12-14.

Steps to be considered in the process of selection of a particular machine for a particular work are discussed. The different steps discussed include, jobs to be done, expected output, accuracies required, ease of maintenance, accessories, service break-up, quality of reliability of machine and prices and the right specifications. (CS)

231. CAMPION, D.: Deep drawing and ironing - theory and practice (part 4) - Practical considerations. Sheet Metal Industries, 1980, 57(9), 830-836.

232. CASTON, J. W.: Flat lapping - Mechanical seals. Engineering World, 1980, 9(8), 9-16.

Presents a brief account of lapping and polishing machines which give a new dimension for mecharical seals. (MVS)

233. GOPINATHAN, G.V & SEN, S.K.: Cold heading die failure - a case study. Machine Building Industry 1978, 17(8), 3-8.

Cold heading is a widely used industrial process for the production of nuts, bolts, anchor nuts, etc. Premature failure of the dies, is a major problem faced in many of these industries. In this article the authors enlighten the causes of failure in general in such dies. A typical die failure was analysed, from the point of view of surface finish hardness microstructure and heat treatment and suitable remedial measures are suggested. (AA)

234. HAWKINS, H.F.: Coils and uncoilers a review of the current state-of-the-art (part 2). Sheet Metal Industries, 1980, 57(9), 824-829.

235. MULLA, D.S.: The machine tools industry. Engineering World, 1980, 8(12), 14-18.

Reviews the performance of the machine tools industry during the last six years and gives prerequisites for future growth. (KLR)

236. ZACHARIA, J & KRISHNAN, P.P.: Greasing of bearing: special greases used in textile mills. Textile Trends, 1980, 23(5), 55-57.

Outlines the important characteristics of greases and discusses the criteria for selection of grease for bearings in the textile industries. Also describes method of greasing and indicates the effects of excess greasing. (CV)

237. ----. An assessment of future demand for aluminium in India. Industrial Researcher, 1980, 7(3), 157-165.

Attempts to estimate the future demand for aluminium, along with a review of price trends and other related aspects. On per capita consumption basis, the total demand is expected to be around 513951 tonnes in 1984.

238. ----: Aluminium foil - A feasibility study. Industrial Researcher, 1980, 7(3), 171-182.

Trends in production, installed capacity, imports, exports, apparent consumption and capacity utilisation of aluminium foil are tabulated. The aggregate demand likely to materialise by 1982-83 will be of the order of 11800 tonnes, with a demand supply gap of 2500 tonnes by 1982-83. For an economic size capacity plant of 1200 tonnes per annum, the total cost of the project works out to ₨ 650 lakhs. (JBS)

239. ----: Gas welding and cutting. Industrial Welder, 1980, 10(10), 15-16.

Discusses the principle of operation involved in metal cutting operation. Oxy-acetylene flame and the safety precautions required in gas cutting are also discussed. (CS)

240. ----: Inertia welding: Simple in principle and application. Welding and Metal Fabrication, 1979, 47(8), 585, 586, 588-590.

Discusses the capabilities, welding parameters and machinery required for inertia welding. The advantages and application of inertia welding are also given. (CS)

241. ----: Safety precautions to be taken in oxy-acetylene welding and cutting. Industrial Welder, 1980, 19(10) 13-14.

242. ACHARYA, B.N.: Explosive cladding of Metals. Chemicals Age of India, 1980, 31(5), 565-570.

Explosion welding technique can be used for producing composite materials combining the best properties of the constituent metals. Explosion clad plates are widely used in various industries including chlor alkali industry in heat exchangers anode connections, intercell connections, etc. The bonded plates have excellent corrosion resistance mechanical properties and electrical properties.

The clad plates can be further rolled to produce thinner gauge products. Normal metal working technique can be employed to fabricate components from clad plates. Use of explosion bonded plates results in saving in capital costs as well as conservation of scarce raw materials without any loss in performance of components.

243. JEZEK, B.: What's your cutting trouble. Welding Design & Fabrication, 1979, 52(12), 76-80.

Enumerates the cutting problems during flame cutting and suggests several solutions. (SS)

244. WILLIAMS, R.N.: A likely pair-EB welding and job shops. Welding Design & Fabrication, 1980, 53(3), 101, 102, 104, 105.

Electron beam (EB) welds mostly in hard or soft vacuum atmosphere. The precision and high quality of EB stems from narrow, deeply penetrating welds having miniature heat-affected zones and low heat input. Discusses the advantages and applications of EB welding. (CS)

## PRINTING

245. BHAGWAT, R.S.: Performance appraisal of wet processing machinery - X. The Indian Textile Journal 1980, 90(11), 82-91.

Reviews working of heat transfer printing system and the increasingly important role played by rotary screen printing in the modern textile industry.

246. BREWER, R.: Printing machinery for every purpose. Paperprintpack India, 1979, 17(11), 39-42.

While recent machinery developments in the printing industry have tended to focus on the pre-press areas, and especially on gravure origination, phototype setting and colour scanners, presses themselves continue to improve in both speed and performance.

247. KOSHTI, R.S.: Printing on roller, flat bed screen and rotary screen printing machines; some experiences. Colourage, 1980, 27(14), 3-10.

Deals with classification of various printing machinery, recent developments and practical experiences on important aspects of printing effects.

248. LESSELIS, G.A.: Water-based flexographic inks-regulated chemical substances. TAPPI, 1980 63(10), 57-59.

Water-based flexographic inks contain chemicals, and for that reason, care should be exercised in the use and disposal of these inks. Since all inks are chemical substances, they are coming under increasing regulation by government agencies as society's environmental concerns increase. Accordingly, the safe handling of water-based flexo-inks which affect the printed ink film and the use and disposal of these inks, assumes increasing importance. (AA)

249. ORTNER, H.E.: A high-consistency deinking system. TAPPI. 1980, 63(10), 83-86.

250. PATEK, J.C.: Quality control of flexographic inks. Crodalinks, Occasional Publication No. 5, 1980, 2p.

A printer's request for a repeat order of a particular flexographic ink sets into motion a whole train of events. This results in the customer being supplied with an identical product to the one previously used. To achieve this requirement, quality control plays an important part at all stages of production. The testing methods for inks, raw materials such as solvents, resins and colouring materials and procedures for testing strengths, hue and gloss are discussed. (JBS)

## ELECTRICAL INDUSTRIES

251. DE B.K.: Electric drives and controls for crane - Part I. Machine Building Industry, 1980, 19(3), 17-25.

Describes various electrical equipment required for A.C. Crane controls and the selection of various components for a particular application. The characteristics of driving motors affecting the crane performance has been briefly outlined. (KLR)

252. GEORGE NELSON, R.: Selection of motors for various industrial applications and maintenance. Machine Building Industry, 1980, 19(3), 3-10.

Describes briefly the guidelines for selection, erection and maintenance procedure adopted for various types of motors used in a cable industry. (KLR)

253. KRISHNAIAH, K.N.: Super enamelled copper wires industry. KSFC News, 1981, 1(8),2-3.

Super enamelled copper wires are a part of the cable and wire industry. These wires are used in electrical motors, transformers, fans, telephone and telegraph equipment, fluorescent tubes relays, etc. The demand for wires depends directly on the demand for these products. The operational constraints the organised sector and small scale units face, both at the All India level and in Karnataka State, are briefly outlined. (JBS)

# SENDOC Services

Featured in this section are technical enquiries that were received and the services rendered by SENDOC during the month of March 1981. The charges for short technical enquiries will be ₨ 5.00 to ₨ 10.00 per typed page. Industry profiles already available with SENDOC are charged at the rate of ₨ 10.00 each.

| Sl. No. | Enquirer | Service Rendered |
|---|---|---|
| 1 | 2 | 3 |
| 1. | DIC, Cuddalore, Tamil Nadu | Profiles on: Anhydrous Aluminium chloride, Aluminium circles, Banana powder, Barium chemicals, X-ray grade barium sulphate, Calcium chloride Cashewnut processing, Desiccated coconut, Cotton ginning, Waste cotton yarn, Printing ink, Insecticides, Hydrated lime, Red oxide primer, Quick lime, Rice milling modernisation, Sodium dichromate, Sodium silicate, Straw board, Aluminium utensils. |
| 2. | DIC, Ongole Andhra Pradesh | Profiles on: Leather garments, Straw board, Plastic waste, Fish preservation and canning, Jute sutali & rope, PVC tiles. |
| 3. | DIC, Pulwana J & K | Profiles on: Dairy products, Lime kiln, Brick kiln, Hair oils, Laundry soap, Cosmetics, Confectionery. |
| 4. | DIC, Srikakulam,AP | Profile on: Alcohol from Mahua flowers |
| 5. | Ent. Andhra Pradesh | Profiles on: Spectacle frames, Glass ampoules, Wire nails, Metal powders, Straw board, Sodium silicate, Hostalen buckets, Plastic cane, Plastic waste, Morpholine, Zinc chloride, PVC pipes, MS washers, Door locks, Suitcase and brief case locks & hinges, HDPE pipes. |
| 6. | Ent. Gujarat | Profile on: Distilled water |
| 7. | Ent. Karnataka | Profiles on: Hydrated lime, Jams, Jellys & pickles, Acrylic sheets. |

| 1 | 2 | 3 |
|---|---|---|
| 8. | Ent. Mahdya Pradesh | Profiles on: Pressure pipes, corrugated board boxes. |
| 9. | Ent. Maharashtra | Technical note on: Hotel Management<br>Profiles on: Particle board from wood waste, Washing soap, Injection moulded plastic articles, Refined castor oil, Copper & aluminium wire, High voltage ceramic capacitors, Red oxide primer, Copper sulphate. |
| 10. | Ent. Orissa | Profiles on: Biscuit making, Cold storage, Maize starch & dextrine, Furfural, Rice bran oil, Egg yolk powder. |
| 11. | Ent. Uttar Pradesh | Profiles on: Bolts & nuts, Coal briquettes, Biscuits. |
| 12. | GD, Bihar | Profile on: Nicotine sulphate |
| 13. | GD, Nagaland | Profile on: Fruit & vegetable canning, Particle board from wood waste, Cotton ginning, Pineapple fibre extraction, Pineapple fibre yarn weaving. |
| 14. | GD. Uttar Pradesh | Technical note on: Sulphur black |
| 15. | SI. Andhra Pradesh | Profiles on: Auto leaf springs, Polypropylene blown film, Activated carbon from coconut shell, Hand tools, Forged hand tools, Aluminium sulphate, Siliconised oil based fat liquors, Chrome pigments, Lacquers, Lacquor emulsion, Acrylic copolymer emulsion, Sprayers & dusters, Welding electrode. |
| 16. | SI. Bihar | Profiles on: Toilet soap, Biscuits, Red oxide primer, Plastic waste, Rubber reclaiming agent, Household detergent powder. |
| 17. | SI. Gujarat | Technical Note on: Cement manufacture |
| 18. | SI. Karnataka | Technical Note on: Use of lime in various industries<br>Profiles on: Maize starch, Hydrated lime, Sodium silicate, Glass bottle, Cardboard from bagasse, Paper from bagasse & agro wastes. |

| 1 | 2 | 3 |
|---|---|---|
| 19. | SI. Madhya Pradesh | Profiles on: Silicagel, RCC spun pipes, Lubricating oil, Refractories, Ferric alum, Cold storage. |
| 20. | SI. Maharashtra | Profile on: Pesticides & insecticides, Paper cones, Bleaching, dyeing and screen printing, Poha. Lithophone, Absorbent cotton,File covers, Semi-mechanised brick unit, Sodium silicate, PVC wires and cables, Surgical gloves, Ball point pen refils, |
| 21. | SI. Orissa | Profiles on: Cattle feed, Metallic watch straps |
| 22. | SI. Punjab | Profile on:Microwave oven |
| 23. | SI. Tamil Nadu | Profile on: Ceramic colours |
| 24. | SI. West Bengal | Profile on: Mutton tallow, Room coolers. |

Note: DIC - District Industries Centre

Ent. - Entrepreneur

GD - Government Department

SI - Small Industry

# New Products and Processes

## CHEMICAL INDUSTRIES

### Ammonium Persulphate

The Central Electrochemical Research Institute (CECRI), Karaikudi, has developed an electrochemical process for the manufacture of ammonium persulphate, a chemical which finds use as a polymerization catalyst in rubber and plastic industries, and also applications in textile industry.

The process, worked out on a bench scale, consists in the electrolysis of an aqueous solution of ammonium sulphate and sulphuric acid using an anode of platinum and a cathode of lead. The temperature of the cell is controlled by circulating cold water through it. The anodic current density is maintained at 100 A/dm$^2$.

The main raw materials required in the process are ammomium sulphate and sulphuric acid, both of which are available in the country.

All the items of equipment required in the process are available indigenously, and include: rectifier, platinum, electrolytic cell (FRP/PVC), feed tanker, storage tank, reaction vessel, filtrate receiver tank, centrifuge, vacuum drier, evaporator, boiler, refrigerator, and PVC pump.

The capacity of an economically viable unit as suggested by CECRI is 90 tonnes/annum. It is estimated that a total investment of ₨ 21.00 lakh, comprising a fixed capital on building of ₨ 2.50 lakh, a fixed capital on plant of ₨ 15.92 lakh and a working capital of ₨ 2.63 lakh, will be required to put up such a unit. The cost of production has been worked out to be ₨ 13.50/kg.

### Membrane Filter - MF 'B'

Membrane filters are used in bacteriological analysis of water and waste water. These filters are hitherto imported under various trade names, and due to non-availability of foreign exchange, only a few laboratories are using them at present. The estimated requirement of these filters is about one million per year.

he suggested economic unit,,to produce one million filters nnually, is as follows: Fixed investment is about ₨ 2 lakhs nd the running cost per annum will be about ₨ 3 lakhs.

ll the plant and machinery are available indigenously. The ost of production according to National Environmental Engineering Research Institute, Nagpur is as follows:

| | ₨ |
|---|---|
| i) Cost of raw materials | 73,850 |
| ii) Depreciation per year on machinery of 1,55,000/- | 31,000 |
| iii) Depreciation in building | 3,200 |
| iv) Staff | 38,800 |
| v) Power | 1,465 |
| Total | 1,48,315 |
| Contingencies @ 10% | 14,831 |
| | 1,63,146 |
| Profit at 25% | 40,785 |
| Risk insurance premia 10% for 1,63,146/- | 16,314 |
| Production of 1 million pieces per annum | 2,20,245 |

Therefore cost per piece: 0.22 paise. The process know-how has been released to four parties.

Terms & Conditions

Lumpsum premium of ₨ 5,000/-
Royalty: 3% on sales
Period of licence: 14 years.

## Molecular Sieve Zeolites from Paddy Husk

Molecular sieves are porous crystalline aluminosilicates of the zeolite mineral group, and have emerged as a new class of efficient adsorbents and catalysts. These can be regenerated readily, show high water adsorption capacity even at very low humidity, and have a longer life as compared to the alternative materials such as active alumina, active carbon and silica gel. Also, corrosion, fouling, safety and material handling problems invariably associated with the wet processes such as scrubbing, extraction or absorption and virtually absent in the case of molecular sieves.

Molecular sieves find various applications in chemical, petrochemical and gas industries as adsorbent for desiccation, drying, bulk separation and recovery of gases and liquids. Molecular sieves are also used as catalysts and catalyst supports in several chemical and petrochemical processes. Owing to their high activity and better product selectivity molecular sieve catalysts are now being used in modern petrochemical industries in place of the conventional silica-alumina catalysts.

Molecular sieves are normally prepared from highly alkaline heterogeneous aluminosilicate gels obtained by mixing various silica and alumina containing substances. Several types of molecular sieves have been synthesized and characterized by their chemical composition, crystal structure, pore size,and other physicochemical properties. Most of the information regarding their synthesis, however, is guarded by patents. The most frequently used molecular sieves available commercially are type A, type X and type Y of the Linda Division of Union Carbide Corporation (USA).

The process, covered by the patent (Indian Patent 520/Del/77) is the result of developmental work undertaken by the Regional Research Laboratory, Jorhat, to synthesize molecular sieves from indigenous sources. The raw material chosen is paddy husk, a cheap agro-industrial waste, which contains, besides lignin and cellulose, 15-20% by weight of ash which is almost pure silica. The nature of the silica present in paddy husk is not clearly known. The process covers the synthesis of molecular sieves of type A and X in which paddy husk is used as the source of silica.

The process consists in (i) extraction of silica from paddy husk as sodium silicate by using sodium hydroxide, (ii) mixing the extract with definite proportions of sodium aluminiate under suitable conditions to prepare the aluminosilicate gel, and (iii) crystallizing the gel under normal pressure and suitable temperatures to produce the desired molecular sieve powder.

The products developed are comparable in their structure thermal stability, water absorption and molecular separation characteristics with the commercial grade Linde molecular sieves.

Based upon pilot plant investigations and cost estimates of the process, a 30 tonnes/annum plant is recommended for commercial production. The process has been referred to the National Research Development Corporation of India for commercial utilization.

## Synthetic Calcium Silicates

Synthetic calcium silicates are available in different grades, having varied physical properties to suit specific applications. These find use in industries such as rubber, paints paper, insecticides, self-setting moulded insulations and plastics.

One of the grades called liquid absorbent grade has high absorbing power, good fluidity and low bulk density. Its major use is as an insecticide carrier.

The filler grade material is considered to be the best non-black reinforcing filler for imparting unusual tensile water strength and abrasion resistance. In paint industry it is used as a matting agent, anticorrosive agent and extender for titanium dioxide.

The insulation grade, which is self-setting under atmospheric pressure, finds use in insulation of steam lines, ovens and furnaces.

A process for preparing suitable grades of calcium silicates required for the above mentioned industries has been developed at the Central Salt & Marine Chemicals Research Institute, Bhavnagar. Sodium silicate is diluted with water and the solution thus obtained is reacted with gypsum to get calcium silicate. The portion of sodium silicate left undissolved in water is treated with hydrochloric acid to obtain silica 'sol.' Lime is sieved and made into a slurry with water. This slurry is reacted with silica 'sol' to give calcium silicate. The products obtained from both these reactions are combined and filtered to separate calcium silicate which is dried and pulverised.

The process has been worked out on a scale of 100 kg per batch.

Lime, hydrochloric acid and sodium silicate are the main raw materials in this process. All of them are available in the country.

The items of plant and machinery required include reaction vessels, filter press, drier, pulveriser pumps and boiler. All these can be procured indigenously.

It is estimated that a plant having a capacity of 300 tonne per annum would require an investment of ₨ 0.66 million, excluding land and buildings. The plant has a potential to employ about 40 persons.

The process has been released to 4 parties and one of them is in production.

## ELECTRONICS AND ELECTRICAL INDUSTRIES

### Electronic System Design Kit

The Centre for Electronics Design Technology at the Indian Institute of Science, Bangalore has developed an Electronic System Design Kit which is an improvement over the conventional design of electronics equipment and systems where the interconnections of the components made by soldering wire pieces were time-consuming and highly prone to malfunctioning. The development of highly complex circuitry has become simpler and faster now, thereby increasing the efficiency of the electronics designer in R & D laboratories and institutions.

The Design Kit consists of a control unit and a breadboard frame with sockets for different components and patchcords which are gold-plated for high reliability. The main unit of the kit has power supplies, clock generator, display and logic level switches, thus making the kit fully self-sufficient. The detachable breadboard can accommodate all the common electronic components and gives an unlimited flexibility in the applications of the kit in both analog and digital circuit designs.

### Fraction Collector

Fraction collector, a sophisticated instrument for dispensing liquid samples of equal volumes in a large number of containers and which finds application in Bio-medical and Analytical laboratories, has been developed in the School of Automation at the Indian Institute of Science, Bangalore.

This instrument, which is small in size, is based on the latest available digital technology, which offers high reliability and accuracy. The choice of drop mode where the fluid drops are sensed by a photo-electric device coupled to an electronic counter (range: 1-999 drops), or 'time mode' where a time generator is used for pulsing at the rate of 0.1 minute (range: 0.1 - 99.9 minutes) is made available.

One complete mechanical movement of the dropper head scans 10 rows each of 10 test tubes.

Materials for the moving parts of the system are selected with a view to maintain accuracy and reliability, even under cold room conditions. This unit has been built using components readily available in the country.

## Hydraulic Setting-Cum-Sammying Machine

Setting-cum-sammying machine is used in the leather industry for setting, striking out and sammying sheep and goat skins to obtain better leather. The machine has been designed by the Engineering Design Centre, Indian Institute of Technology, Madras.

The products developed at the Institute has the following special advantages.

i) A thorough flattening action of the necks and the backbone.

ii) A perfect opening out of the shanks and bellies and consequently an appreciable gain in footage.

iii) A remarkable improvement of the grain surface without damage to the skin.

One prototype of the machine has been designed, by the Institute and fabricated by M/s. Sollai Engineering Works, Madras in financial collaboration with NRDC and successfully commissioned. This machine has the following specifications and has already been sold to the leather industry.

| | |
|---|---|
| Main drive motor: | 10 HP |
| Pulp drive motor: | 5.5 HP |
| Roller drive motor: | 3 HP |
| Power of heated roller : | 10 kw |
| Working width : | 1600 mm |
| Output : | 200-300 skins/hr |
| Overall size of the machine : | 3.28 m x 1.66 m x 1.70 m |

Main materials required are special steel, electric motors, drives, control equipment and hardware items. All these are indigenously available.

The major items of equipment requirement are common workshop equipment like, lathe, drilling machine, shaping machine, welding set. All these are indigenously available.

Any engineering company having basic workshop equipment cited above with adequate fabrication experience can make this machine easily with almost no additional capital investment.

## Oxy-Gas Cutting Machine

A portable power driven machine running on rails has been developed at Central Mechanical Engineering Research Institute, Durgapur, for oxy-gas cutting of steel plates up to 75 mm thickness. This machine is of immense use in fabrication industries. The machine can be used for straight line cuts for circular and gently curved profiles. At present only a few machines of imported origin and some of indigenous manufacture are available.

The hand manipulated torches are not able to give a good degree of steadiness which is the main valuable feature of mechanised cutting apparatus. Uniformity of travel leads to economic use of gases and to cutting at optimum speed. In fact with a correct setting of parameters, we can obtain a degree of accuracy and edge finish requiring no further machine finishing.

The cutting torch is mounted on a portable machine which is driven by universal motor of 1/20 HP, working on 230 volts AC/DC. The machine can withstand the high heat around it. The motor is dynamically balanced to avoid any vibrations which are reflected on the cut surface. The speed of the motor is controlled by torroidal rheostat in series with field. A gear-reduction box is also provided. For circle cutting, the machine is fitted with a special facility to guide the machine.

A prototype of the following specifications has been made and tested successfully with "Indian Oxygen" torch

| | | |
|---|---|---|
| Type | : | Portable |
| Drive motor | : | 1/20 HP, 230 volts Universal type |
| Speed control | : | Series resistance |
| Gear box | : | Triple reduction unit of 3000: 1 |
| Cutting speed | : | 15 to 90 cm per min. |
| Cutting height adjustment | : | 5 cm |
| Cutting transverse adjustment | : | 7.5 cm |
| Cutting level adjustment | : | 70° |
| Net weight of the machine | : | 5 kg. excluding torch |
| Portable track length | : | 2 metres |

The main materials required are cutting torch, universal electric motor, reduction gear box, portable track of 2 metres. All these are available indigenously.

The major items of equipment required are lathe machine, drilling machine, milling machine, shaping machine, slotter machine and tools required by fitters (Tool kit). All these are available indigenously.

An existing manufacturer of engineering goods, who takes up the manufacture of these cutting machines, would need very small additional investment. Ten persons can be additionally employed.

The process has not been licenced so far.

## Thread Whirling Attachment for Lathes

The Production Engineering and Machine Tool Section of the Indian Institute of Technology, Madras has designed and fabricated a high quality Thread Whirling Attachment for lathes. This unit is a precision, high production thread whirler that combines high metal removal capacity with extreme accuracy. It offers the user a capability unequalled by conventional screw cutting machines, eliminates reliance on the human element, avoids expensive cutting tools, reduces set up times, labour costs and increases efficiency. It may be used extensively for machining a wide range of metals to make lead screws, worms, heavy duty screws used in machine tools, fly press screws printing press screws and other parts requiring axial and rotary movements in precise relationship.

The laboratory has also designed and developed a Watch Maker's Lathe suitable for varied applications such as in the repairs of watches, instruments, electronic products, etc. This lathe is now being improved to cover use of carbide tooling.

## Variable Valve-Timing Camshaft

NRDC, UK is seeking licensees for a new variable valvetiming camshaft which improves the performance of four-stroke internal-combustion engines. This simple solution to the problem of valve timing has been devised by Stephen Nitchell, who has worked on the development of engines for several years and is now receiving financial support from NRDC.

Hitherto, engine designers have been compelled to compromise on the valve timing in poppet-valve piston engines by using a one-piece camshaft. Usually the exhaust-valve opening is determined by the maximum operating speed of the engine. Unfortunately, at low engine speeds the exhaust valve opens too early and releases gas which is still at a useful working pressure. Similarly, the inlet-valve closing position is usually arranged to produce maximum torque about the midspeed of the range with the consequence that torque falls off above and below this chosen speed.

The Mitchell variable valve-timing (VVT) camshaft system has been designed to overcome the disadvantage of the fixed-timing camshaft with a view to improving fuel consumption and increasing engine torque at the lower speeds. This is achieved by delaying the exhaust-valve opening as the speed falls, to extend the expansion stroke, and at the same time, advancing the position of inlet-valve closing to increase torque. Inlet-valve opening is also delayed, reducing valve overlap and improving the quality of emissions.

The benefits of VVT have, over the years, encouraged several organisations to develop a variety of designs, but up to now none has shown itself to be commercially attractive. The Mitchell system is a robust and simple design which has a short camshaft for each cylinder. The camshaft is driven by a short link which connects it to the drive from the crankshaft.

In a single-cylinder engine, the camshaft is connected by a link to the camshaft drive sprocket, which is independently mounted and capable of being moved so that the centre line of the sprocket is offset to the centre line of the camshaft.

In the case of a twin-cylinder engine, there are two camshafts, one each side of the moveable sprocket, both connected to the sprocket by links. The system can be applied to engines with either 180° or 360° crankshafts.

The sprocket is moved from its eccentric to concentric position by a hydraulic cylinder fed from a speed-sensitive control. As the engine speed rises, the cylinder extends, decreasing the eccentricity and altering the valve timing. The system normally operates with a maximum eccentricity of 3.5 mm at minimum engine speed with concentricity occuring at slightly less than maximum engine speed.

In the case of a flat-four engine, or a twin driven from the end of the crankshaft, there will be two camshafts, with the second-cylinder camshaft passing through the hollow first cylinder camshaft, both being connected by their links to the driving sprocket. This system is also used for a four-cylinder in-line motorcycle engine with a central sprocket.

As the driving pulley or sprocket moves from its eccentric to concentric position it causes, through the link, the camshaft to change its angular position, relative to the drive shaft , and angular velocity with the result that the valves operate at different times and for different periods depending on engine speed.

For in-line engines, there is a short hollow camshaft for each cylinder. Each camshaft is connected by its link to a common driveshaft which passes through the hollow camshafts and is mounted on sliding bearings so that it can be moved eccentric relative to the camshafts. In a four-cylinder engine, the radial position of the link attachment points will be at 90° and for a six-cylinder engine at 120°.

The link which transmits the drive from driveshaft to camshaft has only a slight angular movement about its own centre at maximum eccentricity when the speeds are lowest; the angular movement decreases as eccentricity reduces and at maximum speed angular movement is eliminated.

With an eccentricity of 3.5 mm, the range of alteration of exhaust valve opening is about 16°, further movement would not give much improvement because of the falling cylinder pressure and a disadvantageous crank angle. The range of alteration to the inlet valve closing is about 17°, which is sufficient to improve low-speed engine torque.

When the system is applied to an automobile engine with inlet and exhaust cams of equal duration, the valve timing can be arranged to operate over a range of:

> Inlet-valve opening at 24° BTDC and closing at 64° ABDC
>
> Exhaust-valve opening at 70° BBDC and closing at 18° ATDC

at high engine speed when the camshaft and driveshaft are concentric to:

> Inlet-valve opening at 17° BTDC and closing at 47° ABDC
>
> Exhaust-valve opening at 54° BBDC and closing at 18° ATDC

at low engine speed when camshaft and driveshaft are at maximum 3.5 mm eccentricity.

The prototype twin motorcycle engine has inlet and exhaust cams of different duration and a slightly greater range of timing:

> Inlet-valve opening at 47° BTDC and closing at 65° ABDC
>
> Exhaust-valve opening at 70° BBDC and closing at 30° ATDC.

at maximum engine speed to:

> Inlet-valve opening at 35° BTDC and closing at 46° ABDC

Exhaust-valve opening at 53° BBDC and closing
at 30° ATDC

at low engine speed.

Other engine timings are possible, depending on cam profile.

Development to date has been limited to motorcylce engines where the mechanism has been shown to work reliably and with a low noise level. Many motorcycle engines give very good high-engine speed performance but poor bottom-end performance. The motorcycles need to be fitted with five and six-speed gearboxes to overcome the problems with the net result of a poor fuel consumption. The

The tests which were carried out on this type of engine showed remarkable improvements in low-engine-speed performances upto 32% increase in power with a simultaneously reduction in specific fuel consumption of 43%. While such gains cannot be expected from the slower-reviving automobile engines, there is evidence to suggest substantial improvements.

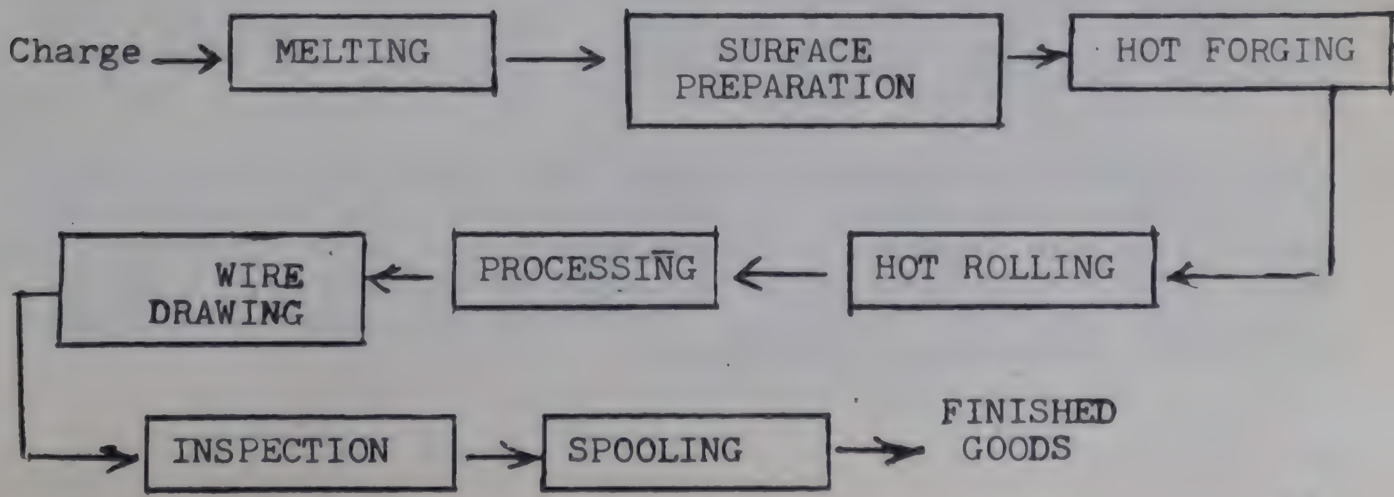
In a vehicle, the Mitchell VVT system could lead to higher-ratio intermediate gears or, alternatively, a smaller engine. Whatever the application, engine performance will be improved both in terms of power output and fuel consumption, and exhaust gases will have reduced content of CO and unburnt hydrocarbons.

The Mitchell system is covered by a number of patents and patent applications in several countries throughout the world. Organisations that are interested in obtaining a licence to incorporate the system are invited to contact Barry Hill, Mechanical and Civil Engineering Group, NRDC.

## METALLURGICAL INDUSTRIES

### Alloys for Heating Elements

BLOCK FLOW DIAGRAM FOR ALLOYS FOR HEATING ELEMENTS



Conventional types of heating elements used for domestic or industrial heating applications contain high percentages of nickel and some cobalt hardly exist in India. This the entire demand of heating elements used in India is met by imports thereby involving heavy drain of foreign echange.

Comprehensive research and development work have been underway at the National Metallurgical Laboratory for several years to develop electrical heating elements free from non-indigenous nickel and cobalt, and these have been successfully developed.

Use of certain elements in small quantities has been found to considerably improve workability without deleterious effect on scaling resistance and also help to inhibit grain growth during high temperature service.

The process developed at the laboratory involves the following steps. The charge is melted in a high frequency melting unit and made into ingots using hot top practice. The ingots then receive surface preparation for subsequent forging and rolling. The machined ingots are hot-forged to bars. The billets obtained are again machined and finally hot-rolled to suitable size rods following proper sequence of passes in a rod rolling mill, where the final rod is simultaneously coiled. Strict control of temperature during rolling and working is required. The rolled rod is pickled, washed and given suitable surface coating for cold drawing. The cold drawing is done in stages. At intermediate stages of drawing, the wires are annealed The finished product is spooled, packaged after all the tests of electrical resistivity, and accelerated life are carried out as per specifications.

The work has been carried out on a laboratory scale. The product has been tested and found to be satisfactory.

The main raw materials required are low carbon iron and low carbon ferrochrome. Other materials required are misch metal ferrozirconium, chemicals and lubricants. Low carbon iron and low carbon ferrochrome are expected to be produced in the country shortly. All other materials are indigenously available.

The major items of equipment required for the plant are high frequency furnaces of 75 lb capcity, rod rolling mill, forging hammer, wire drawing machines, butt welding machine, electric furnaces, gas or oil fired furnaces.

High frequency induction melting unit, forging hammer, rod rolling mill are capital intensive and can be imported against rupee payments through suitable agencies. Wire drawing equipment and drawing dies of both tungsten carbide and diamond types are now made in India. Grinding and shaping machines are also indigenously available.

Investment required for a plant having a capacity to produce 60 tonnes of alloy for heating elements per annum is estimated at ₨ 2 million, excluding land and buildings. The plant can give employment to about 65 persons.

The process has been licenced to 3 parties, of which, one party is in production.

## Electroslag Refining

Recent developments in nuclear, aviation and aerospace industries have led to the demand for quality steels and alloys which are chemically homogenous and which possess greatly improved mechanical properties and reliability. Components such as turbine blades and discs, the rotor shafts of turbogenerators, high temperature bearings, aircraft engine shafts and under - carriage forgings function under severe conditions of temperature and stress, and often in a corrosive atmosphere.

All commercial steels made by conventional methods have sources of weakness in them, such as non-metallic inclusions; segregation caused during the solidification of a liquid alloy due to the differences in chemical compositions of liquids at different stages; and porosity in the ingot because of shrinkage on solidification. Electroslag refining (ESR) which is an improvement over the conventional methods, is a secondary refining process for producing materials free from most of these defects which help meet the various stringent demands.

In the electroslag refining process, the material to be refined is in the form of a cast or forged electrode and is in contact with molten slag. With adequate power supply, sufficient heat is generated in the slag pool to melt the submerged tip of the electrode and droplets of the electrode material fall through the reactive slag layer and are refined. The refined ingot builds up continuously in a water-cooled mould on a water-cooled base plate. The power supply may be either a.c. or d.c.

The slag may be considered the most important part of the ESR set-up as it also plays an important role in controlling the chemical composition of the refined ingot besides being the source of heat generation. Calcium fluoride-based slags have found universal use in the electroslag refining of steels. The addition of calcium oxide increases the basicity and reactivity of calcium fluoride and the addition of alumina increases resistivity, thus providing a higher heat input. So a combination of the three is used in general ESR work.

An experimental ESR unit (50 KVA capacity) has been designed and constructed in the Department of Metallurgy at the Indian Institute of Science, Bangalore, with provision of automatic control of the operation from start to finish. This is capable for producing steel ingots of approximately 75 mm diameter.

The unit has been used for both fundamental studies and development work on quality steels and alloys. The fundamental studies carried out include those on the thermodynamic behaviour of reactive elements like Manganese and chromium during electroslag refining, and useful data have been collected.

The slag compositions suitable for the refining of a number of steels and non-ferrous metals, including some of the special steels made by VISL, nickel base alloys, titanium and aluminium, have been worked out using the experimental unit. For the electroslag refining of reactive metals like titanium, a special mould has been designed and constructed, which will permit the ESR operation to take place in a controlled argon atmosphere.

Other studies taken up include directional solidification of Aluminium nickel eutectic alloys using ESR technology, production of ferritic stainless steels using the ESR route, and dephosphorization of electrode material using special slags.

Studies on the mechanical properties of refined ingots have shown that the workability as well as the fracture toughness is improved considerably after refining.

The department has worked in close collaboration with VISL (Bhadravati) DMRL (Hyderabad) and NAL (Bangalore) on the refining of steels and non-ferrous metals and alloys.

# New Machinery and Equipment

## CHEMICAL PROCESS EQUIPMENT

### Catalysed Resin Dispenser

Dual-purpose dispensing equipment made by Venus Products Inc., is now available from their sole UK agents: CT (London) Ltd. 3, Hobart Place, London SW1. The Venus H.I.S.Casting Unit is designed for the accurate dispensing of catalysed polyester resins incorporating various fillers. It can be used either for casting or for simple dispensing into working containers.

The unit can be supplied for random working, dispensing ready-mixed material as long as the signal is sustained, or it can be equipped with an automatic shottimer. This is a convenient way of dispensing an exact volume of material with excellent repeatability. Another option is remote operation by foot pedal, leaving both hands free to manipulate the container or mould.

Mixing of catalyst and resin is achieved by the well-proven Venus hydraulic injection system, using low hydraulic pressure to inject the catalyst into the resin internally. Catalyst-to-resin ratio is controlled within ± 0.1% by a catalyst content between 0.5 and 3%.

A 4:1 resin pump with a 3 inch air motor develops sufficient power for pumping most filled resins. For highly-filled resins a 5:1 pump is available as an option. Another option is an air purge, to clear the mixing chamber of fillers during flushing.

For resin intake the unit is equipped with a suction wand connected to the inlet by a flexible hose. Drum changing is clean and easy; the wand is simply put into the bung hole of the new drum. To simplify end-of-the-day cleaning there is an internal solvent flush system complete with three-gallon capacity stainless steel tank and flush hose for acetone or methylene chloride.

### Filter Elements

A range of industrial filter elements for purifying liquids, gases and compressed air, in nine standard sizes and eleven interchangeable grades, has been introduced by Ultrafilter GmbH, West Germany.

The series comprises six grades with permanent, regenerable sintered-metal elements (bronze or stainless steel), for filtering relatively coarse particles from air, steam or liquids; and five grades with disposable two-stage or three-stage elements, for total removal of oil, water and dirt from air and gases, for odour removal, andfor 100 per cent bacteria removal. Pore sizes of the sintered elements range from 100 microns down to 1 micron, while the disposable elements all have a nominal pore-size of 0.01 micron, with efficiencies as high as 0.01 p.p.m. for oil removal or 0.005 p.p.m. for odour removal. The sterile grade, for bacterial removal, can be steam-sterilised upto 100 times.

Each element grade is available in nine sizes, permitting complete interchangeability within filter housings. Two standard connection options are available; screw-in and push-fit, each with a silicone-rubber O-ring seal. Housings can be supplied with the elements; alternatively elements can be manufactured with connections and adaptors to suit virtually any existing type of housing. All grades are offered with a minimum service-life guarantee of twelve months, and average life under normal flow conditions is estimated by the company to be up to three years.

The disposable elements have a two-stage filtration medium comprising an inner web of fused mineral micro-fibres faced on both sides with a support and pre-filter medium which removes larger particles and provides mechanical strength. Both components are said to be chemically and biologically inert and utilise no binders or additives.

The small diameter of the fibres and the absence of binders gives the inner medium an 80 per cent void volume and creates a deep three-dimensional filtration matrix within the space available. The composite filtration medium is flanked inside and outside by sleeves of stainless-steel mesh bonded with epoxy resin to stainless-steel end-caps. This construction is said to enable elements to tolerate pressure differentials up to 6 bar. They will also tolerate maximum temperatures of 200°C and flows of 200 per cent above quoted ratings.

Inquiries to: Ultrafilter Ltd., 33 Sandy Way, Tamworth, Staffs. B77 4DS, England.

## Plastic Vacuum Forming Machine

Visco vacuum forming machines are used for forming ABS shells for luggage industries; throw-away containers out of polypropylene sheets; gift articles out of acrylic sheets or for blister packing with PVC films. Standard machines handle 150 mm x 150 mm to 1,200 mm x 1,800 mm size sheets with various depths for forming capacity. They include facilities of pre-blowing plug-assist, drape forming and sandwich heetin

For further information write to: Visco Enterprise, 31,
Shreenath Industrial Estate, Mahakali Road, Andheri (East),
Bombay-400 093.

## ELECTRONICS AND ELECTRICAL EQUIPMENT

### Digital Pocket Thermometer

Economy Engineering has introduced the most advanced portable instrument for measuring temperatures. These are manufactured to the latest design for reliability, compactness and accuracy. 10 mm long LED fluorescent displays ensure clarity of read out. The units are provided with dry batteries and are intended for use with K-type thermocouples. Advanced electronics in the meter provide linearisation of the K-type thermocouples over range of 50 to 1200°C. The precision cold junction is compensated with unique permanently calibrated circuit.

A wide range of factory-calibrated K-type thermocouple probes are available to provide convenient, high accuracy temperature measurement for specific jobs. Interchangeable thermocouples with standard miniature male connector are made available for air, water, oil, gas temp, in engines, surface temp. of motors. pumps, bearings, extruders, ovens, furnaces and other applications for process industry.

For further details contact: Economy Engineering Corporation
19 Bank Street, Sonawala Building, 2nd Floor, Bombay 400023.

### Heat Consumption Monitoring Meter

The Siemens M72131 heat meter is designed to monitor the precise amount of energy required to heat water for industrial and heating purposes. The measuring device comprises the heat meter and a Pt 100 resistance thermometer in each of the return and supply pipes of the hot-water system. A control room version of the heat meter is also available with hot-water meter. The device is claimed to have been approved by the West German Federal Testing Laboratories.

The number of industries using heating via direct heating or central heating systems is increasing daily. The precise number of thermal units consumed can be monitored with heat meter. The device comprises an electronic part with a heat consumption counter or a combined heat and hot-water consumption counter. Both versions have a cylic progress indication on a six-digit non resettable display. The low maintenance heat-meter is available with long-life lithium batteries with a life of approx. 10 years and is therefore independent of the mains supply. The casing has degree of protection IP 400 to DIN 40 050 and can be lead sealed, thus preventing tampering.

The hot-water meter transmits pulses corresponding to a specific flow rate and actuates the counter electronically. A correction module compensates for any fluctuations in the density and specific heat of the water.

The amount of energy used for heating or the heat content of the hot water used can be accurately measured using the heat meter just as an electricity meter measures the electric energy consumed.

Plasma Cutter

The Philips low current plasma cutter (100 A max) fulfills the long-felt need for a portable unit for clean and rapid cutting of stainless steels and other metals up to 25 mm thickness. It can work with a normal oxy-acetylene carriage or manually, if desired.

The unit works on nitrogen and CO2 as plasma media avoiding usage of scarce argon gas and this brings down operating costs to a minimum. The power supply control console, all electronic interlocks and de-ionizing filter and pressure regulator are combined in a single compact package, simplifying both installation.

Further information from Electrodes Dept. Peioc Electronics & Electricals Ltd., Shivasagar Estate, Block A, Worli, Bombay-400018.

Safety Device

Intended primarily for protecting lectronic equipment against high voltage surges in transmission lines, the MTL 370 self-resetting lightning protection unit has other uses as well.

For example, ICI's Approvals Service for intrinsically Safe Electrical Systems (ASISES) has recently endorsed its use for safeguarding the operation of barrier protected instrument installations in hazardous areas of ICI plants when the safe area equipment contains high voltages.

For this purpose the MTL 370 is interposed between visual display units (VDUs) or other high voltage equipment and the safe area circuits, so as to prevent more than the permissible maximum of 250 V being applied to the barriers under fault conditions. The increasing use of VDUs in process instrument systems makes this two-stage protection more and more necessary.

This device of Measurement Technology Ltd. (Power Court Luton, Beds, LUI 3 JJ, England) has now been applied in large numbers by water authorities, airports, radio stations and process instruments users, because of its self-resetting feature which fuse replacement unnecessary after a surge and virtually eliminate downtime and maintenance.

## ENGINEERING EQUIPMENT

### Glass Cutting

Keeping pace with the development and requirements of the glass and ceramic industry, a new machine has been developed by Machman Engineers (India) Ejar Bldg. behind Swastic House, 524, Senapati Bapat Marg, Dadar, Bombay-400028 for accurate cutting of flat and other sections of glass refractories, ceramics, grinding honing media etc. to an accuracy of I m.

The machine consists of the fixed cutting wheel head and upto 3 Hp drive isolated and covered from coolant splash. Special aluminium alloy rollomatic table with IO frictionless bearings rolls on 'V' guides with effortless ease. A supplementary table on this enables the flat section to cut through over the top section of the diamond cutting wheel of diameter upto 400 mm.

Cooling is provided through an individual motorised recirculating system with settling tank, collection through valves and jets on both sides of the wheel. In addition a small coolant submerges the diamond wheel on its bottom section. Convenient motor and pump controls are provided in the front with appropriate splash guards.

### Twin Fly Saw

MachmanEngineers (India) has developed a twin fly saw for cutting 350 mm dia high density polyethylene pipes at the extrusion stage by double headed 600 mm dia carbide saws.

Each of the cutting heads is powered with a 3 HP motor with two 600 mm dia carbide saws. This cutting head assembly rolls on frictionless bearings on square guides mounted on a frame. The frame is suspended by 4 jack screws on the bottom structural base having castor wheels and jacks for stability. The four jack screws on the central frames are provided to give a slope for a gravity return feed of the cutting assembling after finishing the cut.

The clamping jaws are manually adjusted to suit the size of the pipe.

### Vickers Method Hardness Tester

Engineering and Scientific Equipment Limited have introduced a new range of high precision Vickers Method Hardness Testers, All machines within the range are electronically controlled and a new and improved optical system of either the ocular or projector type is incorporated. Every machine has a micrometer adjustment and a digital read out counter and incorporates two testing stations. At the first station the component is indented with 136° diamond pyramid. The test cycle is electronically controlled. The component is then transferred via a high precision linear bearings table to the optical reading station. These machines provide ultra precision testing of components, and additionally the test cycle is speeded up to a rate previously only obtained by the Rockewell or Brinell methods.

These new Vickers Method Machines have loads from 2.5 -100 kgf, a low range Vickers 0.5-10 kgf, and a Micro Hardness Tester of a different design is available with loads from 1-200 grs. In addition to the standard Vicker machines; E.S.E. Ltd. can also supply Vickers/Rockwell methods machines, Vickers/Rockwell/ Brinell method machines to a maximum load of 250 kgf. Availability is within 6/12 weeks from receipt of order dependent upon mode.

Further details please contact: I.A.E.C. (Bombay) Ltd.
43, Dr.V.B. Gandhi Marg
Fort, Bombay-400 023.

## PRINTING MACHINERY

### Adhesive Wax Coater

Paper and film used for artwork and printed circuit design can be pre-coated with self-adhesive wax in a simple and compact unit developed by a British firm specifically for use by studios, printers and any other producers of artwork or paste-ups.

Use of the equipment is far simpler and less messy than the normal manner of applying rubber solution by hand or aerosol to glue artwork into place before printing or processing, Paper treated with the wax is dry to the touch, but adheres lightly when gently pressed into position and can be fixed permanently by burnishing with the roller supplied.

Known as the Flowaxer, the machine accepts 50-305-mm-wide paper, yet occupies a desk space of only 535 mm x 305 mm; it is cased in stainless steel, coated in hammer-finished paint.

Warm liquid wax is applied by feeding paper or film between two adjustable rollers, one carrying the wax and the other exerting pressure to give a coating of precise and even thickness. Both rollers are driven by an electric motor operated by a foot switch and fitted with an overload protection device. Adjustable stripper fingers peel the coated paper off the waxing roller.

Adjustments to the depth of coating or to allow for varying paper/ film thickness are said to be particularly simple and are made by screwdriver from a single adjustment point. A thermostat controls wax temperature, and all electrical components are housed in a separate compartment to prevent contamination by liquid wax.

The unit can hold up to 600 grams of wax and is equipped with a drainage plug at the rear. Standard equipment is operated from a 240-V a.c. supply and rated at 650 W.

Manufacturers: Fry's Metals (Graphics) Ltd.,
The Drove Industrial Estate,
Avis Way, Newhaven, East Sussex
England.

## Compact Guillotine

A 660-mm (26-in.) paper guillotine incorporating many features usually found only on much larger machines has been developed by British firm. Intended principally for use by in-plant printing departments, the Goodhale Powermatic 663 is also suitable for government printing departments and commercial printers.

Fully hydraulic as regards both cutting and clamping, the machine is smooth and quiet and can be operated safely by inexperienced personnel. There are no clutch, brake, belts or pulleys; instead, a simple pressure adjuster on the clamp copes with various stock up to a maximum 75-mm (3-in) capacity. A foot control bar is used to determine the cutting line and permit easy positioning of the paper. A periscope eye-level viewer projects an illuminated magnified scale so that accurate positional changes are easy

The backface comprises a motor-driven worm drive operated by two pushbuttons giving forward and backward motion; built-in safety stops are provided. Fine adjustments can be made with a hand control. Knife changes are simple as there are no covers to remove so that complete change takes only 10 min.

A fail-safe system eliminates any possibility of the knife overrunning if set incorrently. Among other operational safety features are transparent front and rear guards with pushbutton action so that an operators' two hands are needed for the cutting cycle. Both knife and clamp return to the top position if either the front guard or pushbutton is released.

The equipment can be supplied with single-phase of three-phase electrical wiring.

Manufacturers: Murographics Ltd.,
Old Mixon Industrial Estate
Weston-super-Mare, Avon
England.

## Mini-Collator

A mini-collater to produce crimped packs of continuous stationery is offered by British makers with either four or six stations.

The equipment can handle all standard sizes of business form about 175 mm (7 in) to 305 mm (12 in) wide, accepting either carbonless paper or packs with press carbons attached. Operated by one man, the machine takes less than five minutes to setup and can be run at speeds of over 105 m/min (350 ft/min).

Power is provided by a 250-W (1/3 hp) electric motor. The mini-collator is economical to run and is thus equally suitable for in-plant printing departments, firms starting to make continuous stationery and established producers of business forms.

Dimensions of the equipment are approximately 1.8 m long X 1.5 m high X 760 mm wide (6 ft X 5 ft X 2 ft. 5 in.) and it weighs about 600 kg.

Manufacturers: John Morgan Printing Machinery Ltd.
Abbey Mills,
Kingswood
Wotton-under-Edge
Gloucester-shire
England.

## Power Presses With Low Downtime

Five fast-stroling, double-sided presses introduced by a British firm have a number of features specifically designed to keep downtime to a minimum.

Each press in the DS2 range is suitable for progression tooling operations, shallow drawing, blanking and forming; yet it is also of simple and straightforward design.

The frame is a one-piece fabricated steel structure, massively ribbed. It is thus less likely to suffer from breakages than a cast frame. The weight of the gearwheel is supported not by the crankshaft bearings but by a quill concentric with the crankshaft and fixed to the press frame. Crucial bearings are thus relieved of stresses that are a cause of power press failure.

Crankshaft motion is controlled by a combined friction clutch and brake system, operated by an air/hydraulic intensifier. The clutch/brake unit has a mass less than half that of a pneumatic clutch of comparable performance. Due to the unit's smallness and position on the crankshaft its inertia is low, with the result that the brake has relatively little work to do and the press can be single-stroked continuously without overheating and with only minimal wear on the friction plate.

A compact expanding locking mechanism holds the clutch/brake unit on the crankshaft - a simpler arrangement for maintenance and assembly than a keyed mounting. Both clutch and brake are self-compensating for wear over a long period, after which only a simple adjustment is required.

The slide is pneumatically balanced for smooth operation, and is motorised so that adjustments for a change of tool height can be made quickly and accurately.

There are two sets of controls, at front left for tool setting and on a freestanding console. Master stop buttons at each corner of the press and on the console isolate all circuits, de-energise the Motor and apply the brake.

A fail-safe device automatically applies the brake if the air or the electricity supply is interrupted, and an optinally available pressure relief value in the hydraulic system protects against overload.

Manufacturers: Rhodes Interform Ltd.,
Belle Vue, Wakefield,
West Yorkshire
England.

## Web Offset Presses

Greater flexibility, simpler operation and less downtime compared with previous machines are possible with the latest web offset presses for printing business forms. This is chiefly due to the two cross-perforating stations in the paper-processing head which provide a choice of operating positions.

By using two perforating cyclinders of equal diameter, mainfold and supplementary perforations can be made; if two cyclinders of different circumference are used alternatively, downtime between size changes is reduced to a few seconds - of great advantage in producing business forms where runs are usually fairly short and format changes are relatively frequent.

Circumference of the perforating cyclinders ranges from 255 mm to 635 mm (10-25 in) which makes them interchangeable with those on the firm's latest range of collators. The sprocket punching system on the paper-processing head is easily accessible for threading the paper web.

The ink train now incorporate a third, small diameter reciprocating roller, which improves inking over earlier models; and easy folder disengagement facilitates changes from reel-to-fold to reel-to-reel working. Control panels are clearly laid out to minimise operator error.

A cold-glue system is optionally available for the special carbon-paper infeed unit and is particularly useful short runs of cross-perforated packs as it provides a printed paper web plus carbon. The single-line cold-gluing method is said to work efficiently up to a maximum machine speed of nearly 230 m/min (750 ft/min). Another option is a highly accurate, servo-driven, remote-control register which is most effective on presses with three or more colour stations or of complex configuaration as it reduces colour registration to a relatively simple procedure.

Presses can be supplied for wet or dry offset printing, with a choice of dampening systems.

Manufacturers: John Morgan Printing Machinery Ltd.
Abbey Mill, Kingswood, Wotton-under-Edge,
Glucestershire, England.

# Industry Roundup

This section highlights policies and procedures, guidelines, the present status and future prospects in certain industries as well as the latest available data in respect of such industries.

## COIR INDUSTRY

### Introduction

Coir industry is one of the important cottage/village industries in India providing employment and means of livelihood for over half a million people in rural India, where alternative sources of employment are scarce. Kerala is the home of coir in India. The coir fibre or the coco fibre, as it is known in other countries, is familiar throughout the world through the ages. It is also called the golden fibre. Coir secured world wide repute and got established in the world market because of its shining colour, tensile strength and resistance to dampness which helped various and diverse end uses. The main use of coir yarn are fabrication of floor coverings like mats and mattings, manufacture of ropes, cordages, fishing nets etc. It is also used as hopstring in the cultivation of hops in the cold countries. Coir fibre extracted from dry husk has world wide usages as oil filters, brushes and brooms and also for the manufacture of rubberised fibre for cushioning materials. The majority of the workers in the coir industry are women belonging to the backward and minority communities in Kerala.

The first factory to manufacture coir products was started in Alleppey in 1859 by a European entrepreneur by name Mr. Darragh. The manufacture of coir fibre and coir yarn was traditional household industry in the coastal areas of the native States of Travancore and Cochin and the coir yarn was purchased and exported by the traders from the Calcutta Fort. The yarn so exported was used for the manufacture of cheap floor coverings in the schools for the Blind in England by using handlooms. Convinced of the potentiality of the fibre and the yarn Mr. Darragh came to Calcutta to establish a manufacturing unit and found that the yarn is produced mainly in the Travancore State. Mr. Darragh came to Alleppey whcih was of the Chief Port of the State and started a manufacturing unit in the company of another foreign entrepreneur Mr. Ismail and the first coir factory "Darragh Ismail and Company" came into being in Alleppey. From thereon other European entrepreneurs also came to Alleppey and started coir factories, which were mainly export oriented. The coir industry flourished in the coastal areas because of the availability of cheap labour and the abundant raw material and infrastructural facilities.

## Production of Coconuts in India

The area under coconut cultivation during 1977-78 was estimated at 10,82,900 hectares accounting for a production of 5,733,6 million nuts. During 1976-77 the area under cultivation was estimated at 10,74,000 hectares and production of coconuts at 5,837.1 million nuts. Although the area under coconut cultivation in India increased during 77-78, the actual production of coconuts declined compared to the previous year. State-wise production figures revealed that Kerala is the largest producer of coconuts in India. Kerala accounted for 59% of the total production of coconuts in India during 1977-78. The state-wise figures of area under cultivation and production of coconuts during 1976-77 and in 1977-78 are shown in Table-I.

Table I: PRODUCTION OF COCONUTS IN INDIA

| State | Area in hec. 000's | | Prod. in million nuts | |
|---|---|---|---|---|
| | 1976-77 | 1977-78 | 1976-77 | 1977-78 |
| Kerala | 694.5 | 699.1 | 3,443.4 | 3,366.5 |
| Tamilnadu | 108.9 | 109.4 | 1,094.9 | 1,035.5 |
| Karnataka | 153.3 | 155.6 | 777.9 | 815.5 |
| Andhra Pradesh | 39.3 | 39.8 | 162.5 | 164.6 |
| Goa, Daman & Diu & Andaman | 18.7 | 18.7 | 104.0 | 86.0 |
| Nicobar Island | 20.0 | 20.0 | 64.1 | 65.7 |
| Orissa | 13.2 | 13.8 | 53.0 | 58.9 |
| Maharashtra | 9.3 | 9.3 | 50.6 | 49.9 |
| Assam | 4.9 | 4.9 | 25.1 | 31.0 |
| West Bengal | 6.7 | 6.7 | 22.0 | 22.0 |
| Lakshadweep | 2.8 | 2.8 | 21.8 | 21.8 |
| Pondicherry | 1.6 | 1.6 | 16.7 | 15.1 |
| Tripura | 0.8 | 0.8 | 1.1 | 1.1 |
| Total | 1,074.0 | 1,082.9 | 5,837.1 | 5,733.6 |

## Production of Coir in India

In India the production of white fibre is mainly located in Kerala State. Of the total production of 5,734 million nuts in India, the share of Kerala is estimated at 59%. There are abundance of raw material and natural setting facilities in Kerala. It is, therefore, no wonder that the white fibre industry has developed in the State to its present state, unlike in other coconut growing states. The production of brown fibre is also picking up in certain parts of Kerala. Kerala is the only State in India where the industry has developed to manufacture various types of finished products like door mats, mattings, carpets, rugs etc., out of the retted fibre and spun yarn While spinning activities extended over the coastal belt of Kerala State, the manufacturing sector is located mainly in Alleppey, Sherthalli and suburbs. The production of coir mats and mattings etc., is carried on mainly on handlooms. However, a few powerloom factories are also working in the State.

Tamil Nadu is the second largest producer of coir in India. Here coconut production is mainly concentrated in Districts of Tanjore, Kanyakumari, Coimbatore, Tirchirapally, Salem and Madhurai. Retting facilities are available only in Kanayakumari District, at Cuddalore in South Arcot District and some areas in the coastal belt of Tanjore District. In Kanyakumari District the extraction of coir fibre by traditional retting method is well established. This is carriedout by a large number of individuals and a few coir cooperatives to produce a special variety of coir yarn called muppiri yarn for consumption in the domestic market for the manufacture of coir rope. Rope making industry is one of the largest cottage industries in Salem in Tamilnadu. Coir industry in Tamilnadu is fast developing especially in the non-traditional lines of production of brown fibre from unretted husks. Fully integrated factories for the mechanical extraction of coir fibre have been developed in Tamil Nadu. There are about 120 units engaged in the production of brown fibre in Tamil Nadu. Annual production of brown fibre is estimated at 21,000 tonnes. Out of this about 16,000 tonnes is estimated to be converted to coir rope in Salem. A fully automated factory with 38 powerlooms is established in Kanyakumari district for the manufacture of coir mattings.

In Karnataka State, coconut production is concentrated in Tumkur and Hassam Districts. A small portion of the green husks are retted in the coastal areas of South and North Kanara, while a substantial quantity of husks from fully ripe coconuts are used in the mechanical extraction of coir fibre. There are about 62 defibering units spread over in the Districts of Hassan, Tumkur, Chikmagalur, Mysore, Mandya, Bangalore, Chitradurga, South Kanara, North Kanara and Bellary. Two brown fibre curling units and two rubberised coir manufacturing units are also working in Karnataka State.

Coir industry in Andhra Pradesh is mainly concentrated in East Godavari, West Godavari, Srikakulam and Visakhapatnam districts. Retting facilities to a limited extent exist in all these places. A Government owned coir factory is working in West Godavari which is engaged in the production of various kinds of coir goods. There is a difibering unit, in the state run by the Government of Andhra Pradesh, in addition to a number of defibering units working in the private sector. Goa, Maharashtra, Orissa and West Bengal also have a few units engaged in the extraction and utilisation of coir. Lakshadeep also produces coir yarn.

None of the producing states publishes official statistics pertaining to the annual output of coir. In the absence of the reliable data regarding the actual number of units engaged in the production, the labour force employed in the industry and the raw material input, the estimation of annual output of coir in the various states is rendered difficult. The production of coir in India is estimated on the basis of actual exports, trend of internal consumption assessed from the movement of coir by Rail, shipment by coastal steamers and other allied data. During 1978-79 the production of white fibre in India is estimated at 1,46,000 tonnes. Of this Kerala accounted for a production of 1,35,000 tonnes. The balance 11,000 tonnes is estimated to be produced in states other than Kerala. Brown fibre production in India during 1978-79 is estimated at 32,000 tonnes. The Table II A & B indicates the production of coir and coir goods in India.

Table II-A: PRODUCTION OF COIR FIBRE IN INDIA DURING 1976-77

| State | White fibre (Tonnes) | Brown fibre (Tonnes) |
|---|---|---|
| Kerala | 130,000 | 2,500 |
| Tamilnadu | 6,000 | 7,500 |
| Karnataka | 500 | 5,500 |
| Andhra Pradesh | 1,500 | 2,500 |
| Orissa | 1,000 | 500 |
| West Bengal | 1,000 | 500 |
| Other States | 1,000 | 500 |

## Table II-B: PRODUCTION OF COIR IN INDIA DURING 1978-79

| Item | | (Qty. Tonnes) |
|---|---|---|
| Coir fibre | (a) White | 1,46,000 |
| | (b) Brown | 32,000 |
| Coir Yarn | | 1,25,600 |
| Coir Products | | 28,200 |
| Coir Rope | (a) White | 19,600 |
| | (b) Brown | 14,400 |
| Curled Coir | | 2,500 |
| Rubberised Coir | | 1,500 |

### Production of Coir in Kerala

Even in Kerala the production of coir fibre and coir yarn varies from district to district even though coconut is grown in all the districts. The production of white fibre is mainly concentrated in the coastal areas of the old Travancore state and the manufacture of coir products is concentrated in Alleppey District. The production of Coconut in Kerala is steadily declining in the last few years especially in the Travancore-Cochin area as is evident from the Table III.

### Exports

Coir, like tea and jute is by and large an export oriented industry. Coir is exported from India in the form of coir fibre, coir yarn, coir mats, coir mattings, coir rugs and carpets, curled coir and rubberised coir products. India exports coir and coir products to over 90 countries in the world. But, in bulk of our exports of coir and coir goods, say about 70% is purchased by the European countries. In Europe, a large percentage (over 60%) of coir exports goes to West European countries, the main consumers being France, the UK, West Germany, Netherlands, Italy, Belgium etc. Next to Europe America is the largest purchaser coir and coir goods from India (about 14%) followed by East Asia 10%, West Asia 5% and Africa 1%. The trend of export of coir and coir goods from India during the last decade is illustrated in the following tables:

## Table III: PRODUCTION OF COIR IN KERALA

| District | 1975-76 | 1976-77 | 1977-78 | 1978-79 |
|---|---|---|---|---|
| Trivandrum | 44.6 | 42.8 | 40.2 | 32.0 |
| Quilon | 53.1 | 48.5 | 39.1 | 35.7 |
| Alleppey | 44.4 | 40.4 | 33.4 | 28.3 |
| Kottayam | 32.9 | 28.8 | 22.8 | 19.2 |
| Idikki | 12.3 | 6.1 | 5.0 | 4.0 |
| Ernakulam | 28.0 | 26.9 | 25.1 | 27.6 |
| Trichur | 33.8 | 29.9 | 34.5 | 26.6 |
| Mallapuram | 30.8 | 31.1 | 34.5 | 26.6 |
| Palgat | 8.3 | 5.6 | 6.7 | 6.2 |
| Kozhikode | 52.1 | 52.3 | 57.5 | 52.4 |
| Cannanore | 31.5 | 31.5 | 36.3 | 42.2 |
| Total | 373.4 | 343.9 | 334.8 | 305.3 |

## Table IV: EXPORTS OF COIR AND COIR GOODS FROM INDIA

| Year (April-March) | Quantity (Tonnes) | Value (₨ Million) |
|---|---|---|
| 1970-71 | 52,208 | 138.71 |
| 1971-72 | 52,312 | 148.59 |
| 1972-73 | 49,480 | 149.30 |
| 1973-74 | 46,759 | 155.82 |
| 1974-75 | 41,834 | 175.36 |
| 1975-76 | 37,284 | 139.52 |
| 1976-77 | 44,357 | 227.75 |
| 1977-78 | 42,444 | 239.16 |
| 1978-79 | 43,066 | 257.93 |
| 1979-80 | 42,224 | 372.10 |

### Table V: COMPOSITION OF COIR EXPORTS

| Item | | 1974-75 | | 1975-76 | | 1976-77 | | 1977-78 | | 1978-79 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Export | % Share | Export | % Share | Export | % Share | Export | % Share | Export | % Share |
| Coir Fibre | Q | 161 | 0.38 | 266 | 0.71 | 134 | 0.30 | 55 | 0.13 | 35 | 0.09 |
| | V | 3.05 | 0.17 | 6.94 | 0.36 | 2.88 | 0.14 | 1.48 | 0.16 | 1.17 | 0.05 |
| Coir Yarn | Q | 24401 | 58.33 | 22970 | 61.61 | 26567 | 58.89 | 22637 | 53.34 | 23536 | 54.66 |
| | V | 826.71 | 47.14 | 1002.19 | 51.79 | 1052.32 | 46.20 | 910.89 | 38.08 | 1012.75 | 39.27 |
| Coir Mats | Q | 11322 | 27.06 | 7488 | 20.09 | 9582 | 21.60 | 10748 | 25.32 | 10954 | 25.44 |
| | V | 646.53 | 36.87 | 562:48 | 29.07 | 735.18 | 32.28 | 829.13 | 34.66 | 904.78 | 35.09 |
| Coir mattings, Rugs, Carpets etc. | Q | 5049 | 12.07 | ~~524~~5276 | 14.15 | 7020 | 15.83 | 8044 | 18.97 | 8050 | 18.69 |
| | V | 263.29 | 15.02 | 337.12 | 17.42 | 462.00 | 20.28 | 627.25 | 26.22 | 648.71 | 25.16 |
| Coir Rope | Q | 138 | 0.33 | 269 | 0.72 | 185 | 0.42 | 160 | 0.38 | 72 | 0.1 |
| | V | 3.47 | 0.20 | 6.70 | 0.35 | 5.42 | 0.24 | 4.75 | 0.20 | 2.65 | 0.1 |
| Curled Coir | Q | 762 | 1.83 | 1014 | 2.72 | 868 | 1.96 | 789 | 1.86 | 412 | 0.95 |
| | V | 10.40 | 0.60 | 19.52 | 1.01 | 19.48 | 0.86 | 16.67 | 0.70 | 8.35 | 0.33 |
| Rubberised Coir goods | Q | 1 | @ | 1 | @ | 1 | @ | 8 | @ | 7 | @ |
| | V | 0.17 | @ | 0.25 | @ | 1 | @ | 1.67 | 0.08 | 0.90 | @ |
| TOTAL | Q | 41834 | 100.00 | 37284 | 100.00 | 44357 | 100.00 | 42443 | 100.00 | 43066 | 100.00 |
| | V | 1753.62 | 100.00 | 1935.20 | 100.00 | 2277.55 | 100.00 | 2391.84 | 100.00 | 2579.31 | 100.00 |

Q = Quantity in Tonnes

V = Value in ₨ lakhs

@ = Negligible.

## Product Development and Diversification

The growth and survival of any industry lies in the continuous development of new and improved products. In the conception of interior decoration, a silent revolution is taking place. In order to keep pace with the moving times, the Indian coir industry which had been confined to the manufacture of traditional items, has recently adopted various measures for improving the construction, design, pattern, presentation etc., of the traditional products and also for the production of traditional items made suitable for new used. Rubberised coir, needled coir pads, coir tufted carpeting in PVC base, carnetic pile carpets, pile carpet,tiles, kayrool carpets, coir strainer, carpet underlays, hair blended coir products, softened coir products etc., are some of the new products developed by the industry in the wake of technological advances in recent years. The Board's Central Coir Research Institute at Kalavoor is going ahead with a number of projects designed to bring out improvements to the existing products as as also finding newer uses for coir as an industrial material in building construction, road construction for sea erosion control, sand stowing in coal mines and as insulation pads in air conditioning and refrigeration industries. The National Coir Training and Design Centre of the Board has been imparting training to the artisans and entrepreneurs in the industry on improved production techniques. This centre is also providing extension service facilities to actual manufacturers with a view to improve the quality of the product. Similarly the coir Demonstration-cum-Training Centres of the Board at Narasapur, Sakhigopal, Arsikore and Thanjavoor offer training to the local artisans in the extraction of coir from coconut husks by mechanical process as well as in the processing of fibre for the manufacture of different products. A regional office of the Board is also functioning at Bangalore to coordinate the activities aimed at the development of the coir industry in states other than Kerala. Towards modernisation of the industry, certain innovations have also taken place. In the fibre extraction sector, machines have been developed both in the white fibre and brown fibre sectors. In the weaving sector, a few powerlooms imported from foreign countries are engaged in the manufacture of coir mattings. Mechanisation is already in existence in the field of production of curled coir and rubberised coir goods.

## Economic Importance

Coir Industry plays a very important role in the national economy in India. It earns for the country valuable foreign exchange. During 1977-78 it fetched about 24 crores of rupees from exports. The industry also provides employment to about half-a-million people. Altogether a million people spread over the thickly populated coastal areas of Kerala-the home of the coir industry - depend for their livelihood on coir industry. No other cottage industry in Kerala engaged so many people in different sectors of production, manufacture and trade as the coir industry does - and that too with little capital investment.

The fortunes of the industry looked bleak and uncertain in the decade following the independence. But during the last few years the expansion of the internal and foreign market side by side with the development of production sector has enabled the industry to turn the corner and look forward to the future with a sense of confidence and optimism. As long as coconut palms towers high in the coastal belt of Kerala, the coir industry cannot but exist here. (BS)

*Section IV*

# Current Technical Literature

Copies of articles/documents listed in this section are available on payment of ₨ 5/- for the first 5 pages or part thereof and Re 1/- for every subsequent page of the photo copy or xerox copy of the article/document. While placing the order, please mention the CTL number of the SENDOC Bulletin.

| Subject Index. | CTL Nos |
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# CURRENT TECHNICAL LITERATURE

## SCIENCE AND TECHNOLOGY

### Consultancy Services

254. DAVE, S.A.: Technical consultancy organisations their role in regional development. Industrial Researcher, 1980, 6(4), 243-245.

The Industrial Development Bank of India and other all India financial institutions and commercial banks have set up industrial and technical consultancy organisation in different regions. The primary objective of these Technical Consultancy Organisation (TCOs) is to provide a comprehensive package of consultancy services, particularly to entrepreneurs in the small scale and medium sectors and at places and in States where such consultancy services are not easily available at reasonable cost. The operations and assignment taken up by these TCO's are discussed.

255. DIVATIA, P.J.: Role of consultancy services and entrepreneurial development. Industrial Researcher, 1980, 6(4), 249-250.

256. VAIDYANATHAN, T.K.: Industrial Consultancy services in Polytechnics. Machine Building Industry, 1979, 18(5), 25-29.

Some guidelines for organisation and administration of industrial consultancy services and areas in which consultancy services can be rendered by the polytechnics are discussed. (CS)

## AGRO INDUSTRIES

257. ----: Availability and export potentiality for guar-gum. Industrial Researcher, 1980, 7(3), 167-170.

The export of guar gum increased from 37128 tonnes in 1974-75 to 56307 tonnes in 1977-78 but since then it has declined, due to decrease in area under cultivation, power shortage and natural calamities. The export potentiality of this agro-industrial product is analysed.

258. ----: Demand for agricultural tractors. Industrial Researcher, 1979, 6(2), 97-103.

Examines the trends in production and imports of tractors in India and analyses the factors affecting the demand for them. It is shown that by 1982-83, the demand for tractors may exceed the supply.

259. ----: The purchasing executives' buying guide. The Manufacturing Confectioner, 1980, 60(7), 19-175.

List of manufacturers of machinery and equipment, raw materials, packaging supplies and trade names in confectionery industry has been given.

260. LEWIS, Y.S. et al: Quality control of cocoa products. Indian Food Packer, 1980, 34(1), 29-34.

Discusses the quality control aspect of raw material processing and finished products.

261. MINIFIE, B.W.: Lecithin. Manufacturing Confectioner, 1980, 60(4), 47-50.

Explains the use of lecithin in chocolate and confectionery as an emulsifier and in powdered drinks as a wetting agent.

262. MURNEY, W.J.: Biscuits for bakers. British Baker, 1980, 177(15), vii-viii-x, xiv, xvi.

Recipe and process are discussed in detail. (MKSS)

263. RAJORHIA, G.S. & SRINIVASAN, M.R.: Technology of Khoa-a review. The Indian Journal of Dairy Science, 1979, 32(3), 209-215.

Gives a critical account of limitations of batch and continuous method of khoa making and factors affecting chemical composition and microbial quality. The effect of modern packaging materials and microbial inhibitors on shelf life are delineated. (MKSS)

264. RICHARDSON, T.: Chocolate fudge. Manufacturing Confectioner, 1980, 60(4), 73-74.

Manufacturing process of chocolate fudge is given. (MSR)

265. SCHUTTE, L.: Refined soya protein. Food Processing Industry, 1979, 48(576), 44, 47, 51.

Discusses the development of off flavour, method of refining and use of refined product. Flow diagram of refining is also given. (MKSS)

## OILS AND FATS

266. ----: Fats and oils in the 1980s. Journal of the American Oil Chemists Society, 1980, 57(1), 20A-32A.

Presents eight brief essays on what the coming decade may hold for various segments of AOCs related specialities. (MSR)

## VEGETABLE OILS

### Applications

267. ----: Vegetable oils - A profile for industrial applications. Industrial Researcher, 1979, 6(1), 27-34.

Assesses the demand for vegetable oils emerging from different end-uses and estimates it at 46 lakh tonnes by 1982-83, as against the production of these oils in 1978-79 around 26 lakh tonnes.(JBS)

268. BERGER, K.G.: The significance of melting point in fats. The Journal of the Oil Technologists' Association of India, 1980, 11(4), 104-107.

The melting point of edible fats is an item of technical importance. Further food regulations in certain countries impose a melting points limitation on some consumer products. The present paper reviews the significance of melting point from the various points of view significant in food applications.

269. MOTIUK, K.: Wool wax hydrocarbons. A review. Journal of the American Oil Chemists Society, 1980, 57(4), 145-146.

A review of the literature on wool wax hydrocarbons reveals that the hydrocarbons reveals that the hydrocarbons represent about 0.5% and that they consists of a large number of normal and branched homologs. This, in turn shows a structural similarity between the hydrocarbons and the wool wax acids or wool wax aliphatic alcohols; all three materials contain normal, iso and anteiso series. The wool wax hydrocarbons also contain highly branched alkanes as well as cycloalkanes.

270. VIMAL, O.P.: Neem seed: Source of oil, medicinals, pesticide, feed & manure. Chemisphere, 1981, 5(35), 31-33.

Describes the utilisation and applications of neem seed in soap, medicine, pesticides, fertilizers and fodder. Presents the potential of neem seed available in India. Highlights the problem areas such as collection of seeds etc. (MSR)

## SOAPS AND DETERGENTS

271. ----: An assessment of market for synthetic detergents. Industrial Researcher, 1980, 7(3), 203-206.

Estimates an indigenous demand of 3.61 lakh tonnes in 1984, which includes the demand/supply gap of around 1.42 lakh tonnes. Expects more units to come up because of the easy availability of raw materials and popularity of the product in the rural sector. Tabulates production, import/export and consumption of synthetic detergents in India. (JBS)

272. BROCK, T.A: Toilet soap production in 1980. Manufacturing Chemist & Aerosol News, 1980, 51(10), 44-47.

Reviews some of the problems involved with the manufacture and packaging of toilet soap. (BS)

273. COUPLAND, K & CHESTER J.F.L.: Liquid handsoap-the forty year old overnight success. Manufacturing Chemist & Aerosol News, 1980, 51(10), 39-41.

Reviews the market for liquid hand soap and gives formulations for synthetic hand soaphigh solids, semi-synthetic hand cleanser and cosmetic cream hand soap. (BS)

274. MAUSNER, M et al: The ins and outs of packaging laundry detergents. Part I. Household & Personal Products Industry, 1980, 17(9), 48-51.

275. MAUSNER, M.: The ins and outs of packaging laundry detergents. (Part 2). Household & Personal Products Industry, 1980, 17(10), 54, 56, 58 and 59.

276. MILWIDSKY, B.: Soap technology 1. oils, fats and fatty acids. Household & Personal Products Industry, 1979, 16(10), 72, 74, 76, 78, 81 & 83.

Presents an overview of the structure of fats, wide variety of fatty acids and practical sources of fatty materials. (KSDR)

277. MILWIDSKY, B.: Soap technology 9. Principles of formulating syndets. Household & Personal Products Industry, 1980, 17(7), 84-86, 88 & 108.

278. SMITH, C.A.: Pigments of cosmetics. Soap Perfumery & Cosmetics, 1980, 53(9), 532, 533, 535, 537, 538.

Reviews the applications of colours in cosmetic preparations discussing the physical and chemical effects. Gives the typical cosmetic applications of water & oil soluble dyes. (BS)

279. ----: Thermoformed packaging. Package Engineering, 1980, 25(11), 29-32.

Gives the state-of-the-art discussing the aspects of thermoforming equipment and materials. (BS)

280. ----: Ultrasonic assembly of thermoplastics - A new technique. Plastics News, 1980, 10(2), 53-54.

281. BAJAJ, S.H.: Quality control of HDPE bags. Rubber & Plastics Digest, 1980, 15(1), 21-23.

282. LUNDGREN, R.H.: Brushed polyester offers metal look many uses. Paper, Film & Foil Converter, 1979, 53(10), 74 & 76.

A polyester film with a brushed surface that can be used with heat stamping equipment was developed by 3M. The film leaves behind a brushed metal surface that closely resembles the real thing, resulting in cost savings over the use of actual brushed metal. Other uses of the brushed polyester film are enumerated. (BS)

283. ROSENFELD, F.: Thermoforming. Only limitation is the designer's imagination. Plastics News, 1980, 10(7), 47-50.

Highlights the typical examples of three groups of thermoformed articles.

284. SHETH, S.K.: Pigmenting polyethylene film for milk packaging. Plastics News, 1980, 10(1), 21-26.

Discusses the advantages of pigmentation, type of pigments and their method of incorporation into PE film for milk packaging applications.

285. STROHECKER, C.: Injection blow molding Part 1 - Advantages, limitations, and process considerations. Plastics Design & Processing, 1980, 20(9), 41-45.

286. VADODARIA, J.K.: Applications of plastics - some case studies. Plastics News, 1980, 10(9), 49-51.

## LEATHER INDUSTRY

287. ----: Leather footwear - A feasibility study. Industrial Researcher, 1980, 7(3), 191-201.

Deals with the feasibility aspect of leather and rubber footwear manufacturing, based on a market survey. The economic size of a small scale plant with a capacity of 99,000 pairs of leather footwear per year, will involve a total cost of ₨ 12.50 lakhs, providing good profitability at 90 per cent capacity utilisation. (JBS)

288. ----: Task Force Committee suggestions. Indian Footwear, 1980, 4(5), 21-23.

A Task Force Committee was appointed by the Ministry of Commerce, Government of India on 'Leather & Leather products', to review the supply position of hides and skins in respect of domestic and export requirements and to recommend the ways and means to fill up any gap that are identified.

289. RAGHUNATHA, RAO, D et al: A new product for producing tanning cum fatiliquoring effects in leather processing. Leather Processing, 1980, 4(4), 21-22.

The development of TANFAT - mineral tanning cum fatliquoring product is described. The mineral salt complex of the fat base brings about the hydrothermal stability and lubrication of the pickled pelts in a single operation and effects a saving in energy, time and cost.

290. SELVARANGAN, R.: Science and technology of leather manufacture. Leather Markets, 1980, 10(5), 23-26.

Gives the process details.

291. SINHA, P.E et al: Suede upper leathers from wet salted cow hides without using lime and sulphide. Leather Science, 1980, 27(10), 335-357.

292. SINHA, P.E et al: Upper from wet salted cow hides without using lime and sulphide. Leather Science, 1980, 27(9), 302-304.

293. VENKATACHALAM, P.S et al: Alternate technology for the manufacture of semi-chrome glazed goat upper leather. Leather Science, 1980, 27(10), 349-354.

294. ----: Further development of mini-cement plants in India. Chemical Age of India, 1980, 31(8), 851-854.

295. ----: Status of research & development activities on cement in India. Chemical Age of India, 1980, 31(8) 861-865.

296. AGGARWAL, S.P.: Cement machinery manufacturing industry in India - its present status. Chemical Age of India, 1980, 31(8), 883-884.

297. BANERJEE, A.C.: The role of cement in mass housing programmes. Chemical Age of India, 1980, 31(8), 823-825.

A review is presented of some cement-based percast building elements and systems suitable for mass housing programmes which can easily be adopted by the housing boards. (BS)

298. DUTT, G.N.: Export potentialities of minor minerals. Indian Ceramics, 1979, 22(9), 241-244.

Outlines the importance of minor minerals in national economy. Enumerates the minerals that can be exported without any processing or with very little of it, exportable minerals after small processing, the know-how for which is indigenously available and cheap and exportable minerals that require a sophisticated know-how for processing. (BS)

299. MUNDARGI, S.R.: Scientific glass equipment industry in Maharashtra take big strides. Chemical Weekly, 1980 Annual number, 215.

Basic steps involved in the manufacture of scientific glass equipment, raw-materials, and working capital required and organisation and management of a small scale scientific glass equipment industry are given. (MSR)

300. SIVASHUNMUGAM, S.: Manufacturing properties and uses of fibrous glass and glass wool. Glass Udyog, 1979, 8(4), 22-27.

Describes the manufacturing processes, properties with respect to varying compositions, chemical durability and applications. (CV)

SECT Section V

# SENDOC Services

Featured in this section are technical enquiries that were received and the services rendered by SENDOC during the month of April, 1981. The charges for short technical enquiries will be ₨ 5.00 to ₨ 10.00 per typed page. Industry profiles already available with SENDOC are charged at the rate of ₨ 10.00 each.

| S.No.<br>1 | Enquirer<br>2 | Service Rendered<br>3 |
|---|---|---|
| 1. | DIC, Cuddalore<br>Tamil Nadu | Profiles on: Anhydrous Aluminium chloride, Aluminium Circle, Banana Powder, Barium chemicals, Barium sulphate-X-raygrade, Calcium chloride, Cashewnut processing, Desiccated coconut, Cotton ginning, Waste cotton yarn, Printing ink, Insecticides, Hydrated lime, Red oxide primer, Quick lime, Rice milling modernisation, Sodium dichromate, Sodium silicate, Straw board, Aluminium utensils. |
| 2. | Ent. -<br>Andhra Pradesh | Profiles on: Parboiling of paddy, Plastic buttons, Glass marbles, Ragi malt, Bolts & screws, Strawboard, Mill board from Bagasse |
| 3. | Ent.<br>Bihar | Profile on: Carbon block, Tomato sauce/ketchup |
| 4. | Ent.<br>Karnataka | Profile on: Bullock shoe |
| 5. | Ent.<br>Madhya Pradesh | Profile on: Tamarind seed starch |
| 6. | Ent.<br>Maharashtra | Profile on: Fabrication |
| 7. | Ent.<br>Mysore State | Profile on: Microcellular sheets, Poha |

| 1 | 2 | 3 |
|---|---|---|
| 8. | Ent.<br>Orissa | Profile on: Agarbathi |
| 9. | Ent.<br>West Bengal | Technical Note on cement plant |
| 10. | SI<br>Andhra Pradesh | Profile on: PVC Foot wear |
| 11. | SI<br>Assam | Profile on: Mini cement plant |
| 12. | SI<br>Gujarat | Profile on: Hacksaw blade |
| 13. | SI<br>Karnataka | Profile on: Splints and veneers, Stainless steel, utensils |
| 14. | SI<br>Nepal | Profile on: Caustic soda |

Note: DIC - District Industries Centre,
Ent. - Entrepreneur,
SI. - Small Industry.

# New Products and Processes

## CHEMICAL INDUSTRIES

### Alcohol from Tapioca

Tapioca and sugarcane are important biomass sources for the production of alcohol for blending with petrol for running automobiles.

The Central Tuber Crops Research Institute (CTCRI), Trivandrum has designed a pilot plant for the production of power alcohol from tapioca. The plant, which is in the process of fabrication and erection, can produce 100 litres of alcohol per batch. Alcohol-mixed petrol known in short as "Gasohol" has assumed special importance in the context of the present energy crisis and in the wake of mounting crude prices.

The total annual requirement of petrol for automobiles and other internal combustion engines in the country is placed at 2,117 million litres. If alcohol could be blended with petrol at 20% level, petrol consumption could be reduced to 1,693.60 million litres. This would need the production of 423.40 million litres of alcohol for blending with petrol.

Currently power alcohol is produced mainly from sugarcane molasses. The bulk of the alcohol produced goes for beverages, chemicals and pharmaceuticals industries. To meet the additional requirement of 423 million litres of power alcohol, about 2.82 million tonnes of raw cassava are required. This quantity can be got from 0.170 million hectares of land, with an average yield of 16.6 tonnes per hec tare.

### Precipitated and Activated Calcium Carbonate

The process developed by the Central Salt & Marine Chemicals Research Institute, Bhavnagar relates to continuous carbonation of lime to obtain precipitated and activated calcium carbonate. Precipitated and activated calcium carbonate is used as a filler in rubber, plastics, paints, paper, pharmaceutical, toothpastes, and cosmetics industries.

Precipitated calcium carbonate is being produced in the country. The installed capacity is about 16,000 tonnes/annum. The future demand is, however, estimated around 40,000 tonnes per annum. The present market price ranges between ₨.1600 and 2400 per tonne depending upon grade.

Main raw materials are lime containing more than 90% CaO, flue gases from boiler containing about 16% $CO_2$ by volume and steam from boiler for drying the product.

Lime is hydrated, classified and enriched using rotary lime slaker and hydrocyclone. The hydrated lime containing 125 gm/litre of CaO is carbonated by purified boiler flue gases containing about 16% $CO_2$ by volume. The carbonated slurry is treated with sodium stearate solution for activation, which is filtered, dried and pulverised to the required size before packing.

Carbonation tower boiler, rotary vacuum filter, lime slaker hydrocyclone micropulveriser, gas purification equipment, compressor, tray dryer, pumps are the main equipment all of which are available indigenously.

Pre-design cost data (basis: 10 tonnes/day)

| | |
|---|---|
| Land and building | ₨.5.00 lakhs |
| Plant and machinery | ₨.24.65 lakhs |
| Working capital | ₨.9.00 lakhs |

Cost of production

| | |
|---|---|
| a. precipitated calcium carbonate | ₨.970/tonne |
| b. activated calcium carbonate | ₨.1,330/tonne |

Carbonation studies were carried out in experimental batches producing 6 to 8 kg. of calcium carbonate. The product was found to conform to specifications.

## Regeneration of Plaster of Paris from Waste Plaster Mould

The Central Glass & Ceramic Research Institute, Calcutta has developed a process for manufacturing plaster of paris from waste plaster mould. Plaster of Paris is a very essential indirect raw material in all ceramic and pottery industries of the country and as such, has a huge demand. It is well known that plaster moulds loose efficiency after specific number of casts and are usually rejected. The waste moulds find limited use in cement industries while the major portion is being wasted. Waste moulds can be regenerated to plaster of paris of requisite properties by the process developed at CGCRI. Present requirements of plaster of paris by sanitaryware units, insulator units and tableware units is approximately 10,000 TPA, worth about s.55 lakhs. It has been found that 75% of this quantity accumulates every year as waste mould.

The process consists of the following steps:

1. Crushing the waste moulds in a jaw crusher;
2. Powdering the crushed material to - 40 mesh in a disintegrator;
3. Chemical treatment in a reaction chamber followed by washing;
4. Filter pressing of the treated material;
5. Drying of the filter pressed cakes;
6. Crushing the dry cakes in a jaw crusher;
7. Pulverising (-40 mesh);
8. Calcination of the powdered material in an electrical calcinator in the temperature range of 130-200°C.
9. Pulverising the calcined material in a micro pulveriser.

The know-how of the process developed has been tried on a semicommercial scale at CGCRI, Calcutta. One noteworthy feature of the process lies in the fact that the process when adopted would not only be able to utilize a waste product but also generate the desired raw material at the factory site itself.

A capacity to process 3000 tonnes of plaster moulds per annum, on the basis of 300 working days per year (one shift basis) would yield 2000 tonnes of the plaster of paris.

The materials required for the process are waste plaster moulds and some chemicals. The unit also requires utilities such as water, electricity and furnace oil. The annual quantitative requirement of materials and utilities is given below:

| | |
|---|---|
| Waste plaster mould | 3000 tonnes |
| Electricity | 60,000 kwh |
| Furnace oil | 40 mt |
| Water | 1000 kl |

The following equipments are required:

| | |
|---|---|
| Jaw crusher | 1 |
| Disintegrator | 2 |
| Reaction tanks | 3 |
| Filter press | 2 |
| Calcination furnace | 2 |
| Pulverisers | 1 |

The investment as estimated for the plant of capacity/ described above is as follows:

| | |
|---|---|
| Cost of land and factory shed | Rs. 1.00 lakh |
| Fixed capital on plant and equipment | 5.00 lakhs |
| Working capital for 90 days | 1.50 lakhs |
| Total capital outlay | Rs. 7.50 lakhs |

## Zinc Silicate Green Phosphor

Zinc silicate green phosphor is mainly used in green fluorescent tube-lights and in cathodoluminescent devices. It can also be used for other purposes such as in oscilloscope screens, TV screens, etc., either singly or in combination with other phosphors. The process would be of particular interest to manufacturers of fluorescent tube-lights and cathode ray devices.

The current demand, estimated at about 3 tonnes/yr is met entirely through imports. With the increased use of fluorescent lights in urban and rural areas, this demand is bound to increase manifold. The market price reported some time back was Rs.150 to Rs.200 per kg.

Main raw materials are Zinc oxide (AR), silica of high purity, manganese sulphate. All of them are available indigenou ly.

A mixture of zinc oxide and silica or respective compounds which yield these on heating, taken in set proportions and in finely divided form, is made into slurry with water. The mixture along with a small quantity of "exciter" such as manganese chloride or nitrate is heated in air in closed silica vessels at around 1250°C. The resultant product is ground, sieved. The phosphor, when excited by 2537°A, gives green emission.

Main equipment are Ball mill; weighing machine; air oven and furnace (up to 1400°C). All are available indigenously. An ultra-violet lamp of 2537°A, required for testing, has to be imported.

Pre-design plant data (basis: 3 tonnes per annum)

| | |
|---|---|
| Land and building | Rs.0.50 lakhs |
| Plant and machinery | Rs.1.58 lakhs |
| Working capital | Rs.1.50 lakhs |
| Cost of production | Rs.125/kg. |

Investigations were carried at the Central Electro-Chemical Research Institute, Karaikudi on batch scale of 150 gms each. Product thus obtained has been tested for spectral energy distribution of emission and intensities and found comparable to commercial samples.

## ELECTRICAL & ELECTRONICS INDUSTRIES

### Dual Frequency Electro-Magnetic Unit (Ground)

The device is used to detect underground ore bodies like massive metallic sulphides under a cover of poorly conducting overburden.

The instrument is based on the principle of electro-magnetic induction. It consists of a transmitting coil and a receiving coil coupled to each other via intervening ground. The instrument measures the distortion of the electro-magnetic field in the receiver location by taking reference from the transmitter. The range of detection is about 150 to 200 feet. This is a null type device in which a piezo-electric headphone is used as the null detector.

Work at National Geophysical Research Institute (NGRI), Hyderabad has been carried out on a batch scale and so far eight instruments have been fabricated and tested by the actual users. The performance of all these instruments has been found satisfactory.

The main raw materials/components required are electronic hardware like transistors, diodes, integrated circuits, capacitors, chokes and also mu-metal strips which are to be imported. Approx. import content is about ₨.1500 to ₨.2000.

No special plant and machinery is required forfabrication of the unit. Bench drill, vice, grinder and some hand tools are enough to fabricate the unit.

The main test instruments required are digital multi-meter, frequency counter, oscillator, function generator, attenuator, oscilloscope, L.C.R. meter, battery charger, power supply and accumulators. All these items are available indigenously.

Manufacturing this item alone is not a viable venture. But if taken by a unit that is already established and geared to manufacture allied items, the manufacture of this item can become commercially viable as the investment on plant and machinery need not be duplicated.

Cost of production per unit is approximately ₨.11,000.

## In Situ Temperature and Salinity Meter

The in situ temperature and salinity meter is used for determining the temperature and salinity at different depths in the sea. The instrument is used extensively by the Navy and is also required by various oceanographic and fisheries institutions and universities engaged in academic and applied oceanography work.

The current demand for the instrument is being met through imports from Canada, UK and Australia. The estimated future demand is about 50 Nos. per year. The present market price is about Rs.5,500 per piece (exclusive of underwater cables).

The instrument developed by the National Institute of Oceanography, Goa consists of an electronic display meter and two sensing probes, connected by a long 3-core PVC cables. The temperature is sensed by a thermistor suitably encased in a strong stainless steel chamber. The salinity is sensed in terms of conductivity of the sea water, which is proportional to the former at constant temperature. The temperature correction for salinity is obtained from the calibration charts prepared for different temperatures. The information is displayed on microammeters with provision for feeding the signals to continuous recorders.

### Specifications

| | |
|---|---|
| Temperature range | 20-38°C<br>(accuracy ± 0.02°C) |
| Salinity range | 0.37%<br>(accuracy of ± 0.03%) |
| Operates on | 9 V dry cell |

Main raw materials are Perspex sheet and tube, platinum tape, PVC cable, stainless steel tube, silicone oil, aluminium sheet and electronic items like transistors, diodes, OP-Amps, zener diodes, microammeter, bandswitch, printed boards, dry cells and battery box. All items are available indigenously.

Main equipment - Oscilloscope, power supply, multi-meter, digital voltmeter, transistor tester, electric drill, grinder, precision lathe, PVC welding set, etc. All the items are available indigenously.

### Predesign cost data (basis 50 units/year)

| | |
|---|---|
| Land and building | Rs.0.60 lakh |
| Plant and machinery | Rs.0.61 lakh |
| Working Capital | Rs.0.27 lakh |
| Cost of production | Rs.5,500 per piece |

Prototypes developed have been found to match the imported instruments in quality. They have been successfully used by the Central Institute of Fisheries Technology, Cochin. They have also been used by NIO in a series of observations during the ONGC pipeline survey off Gujarat since 1978, under rather extreme conditions and found satisfactory.

## Portable X-Radiography Unit

X-radiography is an important non-destructive testing technique for various engineering materials. The portable X-radiography unit developed is for non-destructive testing of FRP structures of up to 400 mm thickness. The unit is usable for X-ray inspection of broken filaments, knots or splices in roving, fibre misalignment, voids, delamination, honeycomb sandwich constructions, etc. in FRP materials. The unit can also be used for inspection of low absorption materials like plastics, rubber and insulation.

At present, there is no indigenous manufacture of X-radiography units of the range 0-50 or 60 KVP, which is the type needed for plastics, FRP composites, light metal industries, etc. The estimated demand can be anywhere between 50 and 100 units per annum. The demand is bound to grow in view of large number of small scale industries dealing with FRP components, plastics, etc. and various educational institutes dealing with teaching in engineering materials. The unit is expected to cost about ₨.10,000 as against the available commercial unit (of 100 KVP voltage range) costing over ₨.75 to 80 thousand per unit.

The unit consists of a portable X-ray tube head and a control panel. The tube head comprises a step-up transformer and X-ray tube working on self rectifying mode. The unit works on grounded cathode principle; hence the filament transformer is housed in the control panel itself, and it is designed to have a high leakage reactance in order to have built-in short-circuit current limiting property.

Specifications: I. Control box - Houses all instruments, switches, timer and pilot lamp. (a) Main connection: operates on 230/250 volts, 50 Hz single phase power supply, consuming a max-line current of 2 amperes; (b) high voltage: stepless adjustable from 0-60 KVP; (c) tube current: stepless adjustable from 0 to 5 mA; (d) timer: electronic timer 0 to 12 minutes duration and continuous operation; (e) filament transformer input: 230 V, 50 Hz single phase, output: 7 volts (open circuit) ,5 volts at 3.6 Amps, 7.0 Amps maximum short circuit current.

II. Tube head - Contains the high-voltage transformer and X-ray tube. (a) H.T.Transformer: input: 230V, 50 Hz single phase, output: 72 KVP (open circuit), 60 KVP at 10 mA, continuous rating; (b) X-ray tube: stationery anode X-ray tube type DSA 1-85/15-BEL make.

The main components are electronic timers, transformer laminations, 10 Amps electromagnetic contractors, 6 core instrumentation cable, X-ray tube (BEL), etc.

The main equipment required are winding machine, vacuum filling facility, transformer oil filtering facility, oil testing facility, multi-meters, etc.

Pre-design cost data (basis 50 units/year)

| | |
|---|---|
| Land and building | ₨.0.30 lakhs |
| Equipment and machinery | ₨.0.90 lakhs |
| Working Capital | ₨.1.00 lakh |
| Cost of production | ₨.1000/unit |

The first portable X-radiography unit Model NALXR-01, designed by the National Aeronautical Laboratory, Bangalore, has been evaluated for conducting tests on FRP samples of up to 40mm thickness. The unit has been successfully used for testing FRP structures and other low absorption materials developed in the laboratory.

## Shallow Electromagnetic Prospecting Unit (Metal Detector)

The device is used to detect the presence of metallic objects buried in earth or hidden masonry walls. Objects can be coins, jewellery, containers, etc. The device can detect a metallic box of one cubic feet size at a distance of four feet.

It is an electronic instrument employing principles of electromagnetic induction. It consists of a 25 KHz frequency transmitter and a tuned receiver placed only a meter apart from each other. The receiver is so disposed that normally (i.e. when there is no electrical conductor in the vicinity) there is no signal caused in it by the transmitter. But when the device is brought near a conductor, it introduces distortion in the field which produces voltages that can be detected. The device operates on nine volts battery and weighs about 4 kg. It is kept inside a non-metallic casing and is about one meter long. Height and width are 4" x 5".

The instrument has been under production on a batch scale at the National Geophysical Research Institute, Hyderabad and so far seven units have been made and tested. The performance of these units have been found satisfactory.

The main raw materials/components required are ferrite core, diode, transistors, capacitors, resistances, glass epoxy copper clad board, bakelite and panel meters. All these items are available indigenously.

The general purpose machine tools like bench drill, vise, grinder and some hand tools are required for fabrication of the unit. All these items are available indigenously.

Manufacturing this item alone is not a viable venture. But if taken by a unit that is already established and geared to manufacture allied items, the manufacture of this item can become commercially viable as the investment on plant and machinery need not be duplicated.

Cost of production/unit is Rs.5,000/- approximately.

## ENGINEERING INDUSTRIES

### Electrothermal Prestressing Technique

Prestressed components like solid slabs, hollowcored and channel flooring units, etc. are used in construction of residential, institutional and industrial buildings. Prestressed poles are used for transmission lines by the electricity boards, while prestressed sleepers find use in high speed railway tracks. At present , prestressed concrete components are manufactured using high tensile steel wires and strands which are stressed and anchored by using proprietary methods patented by various agencies. The technique developed dispenses with the use of high tensile steel wires and strands; cheaper high strength deformed bars are used in their place.

Indigenous production of high tensile steel wires/strands is about 35,000 tonnes per annum. Billets for producing high tensile wires/strands are being imported from Japan, UK etc. The future demand is estimated around 50,000 tonnes of high tensile wires/strands. The present cost of prestressing by mechanical methods is about Rs.540 per tonne of steel. High strength deformed bars which are produced in millions of tonnes in our steel plants can advantageously replace the high tensile wire for prestressing operations.

The electrothermal prestressing technique consists in elongating the deformed bars by heating them electrically on a mobile heating stand. The heating stand is designed to heat 3 or 4 bars at a time. The bars are provided with welded or other types of anchorages on either end. The distance between the anchorages is so adjusted that on obtaining the required elongation after heating, the bars exactly fit into the slots or brackets in the mould or in the end plates of the pretensioning bed, which prevents them from shrinking to the original length, thus giving the desired pretensioning.

The technique is covered by a patent.

Main raw materials are: High strength deformed bars and electrodes for welding, both items conforming to relevant IS specifications. These are available indigenously.

Main equipment needed: Heating stands, transformer with switching devices and self-straining moulds or pretensioning beds. All items are available indigenously.

Predesign cost data

| | |
|---|---|
| Land and building | Existing |
| Plant and machinery | ₨.25,000 |
| Working Capital | Depends on production capacity |
| Cost of prestressing | ₨.140 per tonne of steel (excluding cost of steel) |

A prototype of 10m long heating stand and its accessories with capacity to heat 3 bars simultaneously, installed at the Structural Engineering Research Centre, Madras is in operation. Twelve beams of 10m span have been cast and used in the Administrative Building in CSIR Complex, Madras. Another 12 Nos. of channel shaped floor units of 7.5 m. span have been cast and used in the Experimental Fly Ash building in the CSIR Campus. In addition, 3 beams, 18 channel units and 18 sleepers were also produced and tested. The final product was found to meet the relevant IS and international specifications.

Fluidized Bed Incinerators

A circulating fluidised bed (CFB) incenerator to burn refuse on a large scale more cheaply and without atmospheric pollution has been developed in UK. It can be used either as simple incinerators or linked to a boiler to provide steam for electrical power generation. The CFB incinerators are small and easier to install and can use a wide range of fuels and mixtures of fuels, such as coal, plastic waste, sewage sludge and raw domestic refuse. It can also be used for burning agricultural wastes to generate power. It finds application in cement making, bagasse burning, disposing of wastes on ships and oil rigs, and in extracting pollutants from gas turbines and big diesel exhausts and at the same time supplying heat for extra power.

In CFB, sand is first heated to 800°C by blowing burning gas through it. Then a stream of pulverised refuse and air is blown in to keep the combustion going. The air is fed in at different pressures at different points making the movement of particles in the bed continuous. The circulating effect ensures a complete combustion of entire refuse fed into the incinerators and no unburnt particles are carried along with the exhaust gases to pollute the atmosphere. An appropriate quantity of solid alkaline or acid chemicals can also be mixed into sand during combustion to neutralise any acid or alkaline fumes produced by the burning of refuse. The incombustible residue collects in a trough, which can be used as a land filling material.

The circulating fluidised bed incinerators are marketed in UK by a London-based company, Appa Thermal Exchanges. Imperial Metals of Birmingham is producing furnaces which can burn domestic rubbish mixed half-to-half with coal to provide economic power.

For further details, please write to the British Information Services, Commercial Department, British High Commission, Chanakyapuri, New Delhi 110021 or at the offices of the British Deputy High Commissioner located at Bombay, Calcutta and Madras.

## Heat Sealer for Flexible Films

The Central Food Technological Research Institute, Mysore-570013, has developed a portable type, continuous heat sealer for sealing flexible films, like thermoplastic film materials, the design drawings of which are available direct from the Laboratory. The sealer is used for making thermo-plastic pouches or for sealing filled-in pouches of different sizes. The sealer is of relatively simple design. It is electrically operated.

Only manually operated sealers are made indigenously. At present continuous sealers are being imported. The estimated demand is about 50 machines per annum. The present market price of a continuous sealer is about ₨.4,000/-.

The sealer consists of a pair, each of hot and cold bars. The hot bars are heated by cartridge heaters. The cold bars are cooled by air from a blower wheel attached to a 1/10 hp motor. The motor also drives a pair of stainless steel bands, which travel between the hot and cold bars. The material to be sealed is fed between the stainless steel bands at one end and the sealed material is received at the other end. There are arrangements for adjustment of pressure as well as the gap between the bands. The machine works on 250 V, 50c/s A.C. It can be mounted on a table.

Mild steel plates, M.S. square rod, 1/10 hp series motor with shaft on both sides, brass bars, cartridge heaters, thermostatic switch, roller bearing ,etc. are the main raw materials. Except the stainless steel bands, which are imported, all other materials are available indigenously.

The main equipment required are Ordinary mechanical workshop facilities like lathes, shaping machine, drilling machine, welding machine, smithy shop etc.

The manufacture of heat sealer can be taken up by any existing small scale industry having the above facilities for fabrication. The cost of production is estimated at ₨.4,000/- per unit having a capacity to manufacture 25 pouches of 20 cm width per minute.

A prototype fabricated by the Institute has been successfully tested. It is available to entrepreneurs for inspection.

The design drawings are available against a payment of ₨.1,000/- and the Institute can help the entrepreneur to modify the design to suit materials and facilities available. Interested parties may contact the Director, Central Food Technological Research Institute, Mysore-570013.

## FOOD AND ALLIED INDUSTRIES

### Chitosan

Chitosan is a new product developed in India by the Central Food Technological Research Institute, Mysore. The main producers are Japan, USA & France who are using the product in the treatment of industrial waste. Some of the important uses of Chitosan are:

1. manufacture of ion exchange membranes
2. metal recovery from waste streams, recovery of iron ore fines from water slurry
3. industrial process water purification for recycling
4. industrial effluent treatment
5. paper strength additive
6. dye binder in textiles/screen film printing
7. adhesives in plywood industry
8. wound healing formulations
9. surgical adjuncts

However, Chitosan is being used on an experimental basis in very small quantities by various washeries in the country to replace otherwise costly materials and it is expected that at least in some cases, results will be positive.

It has been found by the Water Division, National Environmental Engineering Research Institute, Nagpur, that in case of water purification, Chitosan is at least 200 times better than alum.

Squilla is crushed to required particle size and passed through a meat separator. The meat slurry may be precipitated with acid, filtered and dried to get animal feed supplement. The carapace obtained is a complex of chitin, calcium carbonate and protein. Carapace is treated with caustic soda solution for some time. After deproteinisation, the slurry is filtered and washed with water.

Carapace is now put into a tank of dilute hydrochloric acid with constant stirring till no carbon dioxide evolves. This is then filtered and washed. The residue obtained is chitin. The free moisture from the chitin is pressed in a hydraulic press, and the wet chitin is charged into a reactor where sodium hydroxide is added and desired temperature maintained for a certain period when deacetylation will be just enough to make the product soluble in dilute acids. The contents of the reactor are discharged into a separator to recover the spent alkali. Chitosan is washed free of alkali and the moisture is pressed out in a screw press. The Chitosan is initially sun dried and finally the moisture is removed in a mechanical drier.

Raw material & Utilities required per kg. of Chitosan Flakes

| | | | |
|---|---|---|---|
| Prawn waste | 16 kgs. | Water | 500 Lit. |
| Squilla | 33 kgs. | Power | 2 KWH |
| Sodium hydroxide | 6.5 kgs. | Hydrochloric Acid | 5.25 kgs. |

The laboratory has done work on a bench scale of 100 kgs. of squilla/batch. A pilot plant capable of processing 250 kg/hr of squilla has been put up at Mangalore and is in running condition. At present trials are being conducted on this plant.

The main raw materials required are sodium hydroxide, hydrochloric acid and squilla or prawn waste. All these are available indigenously.

The main items of equipment required are screw conveyor, crusher, pulper, jacketted kettles, agitators, vibro filter, hydraulic press, mixer, drier, storage tanks, boiler etc. All are available indigenously.

Manpower requirement:

| | |
|---|---|
| Managerial | 2 |
| Technical | 2 |
| Others | 17 |

Plant Parameters:

| | |
|---|---|
| Production capacity | 5 tons of Prawn wastes or 10 tons of squilla/day |
| Number of shifts | 3 shifts per day for 200 days |
| Investment(excluding land and building) | ₨.10.0 lakhs |
| Cost of Production | ₨.61/kg. of chitosan |
| Yield | 150 kg. of chitosan from Squilla and 225 kg. of chitosan from Prawn waste |

| | | |
|---|---|---|
| Area Required | Total | 2500 $m^2$ |
| | Covered | 350 $m^2$ |

## Flavour Blends for Orange and Lemon-Lime Carbonated Beverage

There are several firms in India which are importing the orange and lemon oil from U.K., U.S.A., Italy etc. both in natural and processed forms and subsequently processing and blending to the local requirements. The quantity of orange and lemon oil imported during 1974-75 was to the tune of 38 tonnes and 21 tonnes respectively. In view of this, the Central Food Technological Research Institute, Mysore has developed the flavour blends for Orange and Lime-Lemon carbonated beverages.

These flavour blends form the base material for carbonated beverages like orange, lime, lemon etc. The orange beverage prepared from the orange flavour blend is similar to 'Fanta', an item formerly imported. A crystal clear lemon-lime beverage prepared from the lemon-lime flavour blend is similar to "Seven UP" - a popular beverage in U.S.A. and other places. The product which is the deterpenated citrus oil also finds use in flavouring confectionery-bakery goods and pharmaceuticals while the by product, terpene rich citrus oil can be used as a flavouring agent in cosmetics and toiletries, as a solvent in perfumery and as thinner for paints.

The estimated sale of the carbonated beverages for 1977-78 was about 600 million bottles. Though there is no data available as to the quantity of orange, lemon-lime carbonated beverages, however, it may be estimated that the market for orange and lemon lime beverages may be about 200 & 100 million bottles respectively. The present market price varies from ₨.50,000/- to ₨.80,000/- per 100 units of flavour blends. One unit of flavour blend will yield 10,000 bottles of finished beverage.

### Process for (a) Orange flavour composition

Cold pressed orange oil is purified using (i) solvent extraction (ii) chromatographic and (iii) fractional distillation methods in batches of 5 kg. and more.

In the solvent extraction, the oxygenated flavour components are preferentially extracted by aqueous alcohol and concentrated. The chromatographic process involves the use of silica gel as absorbent and elution by solvents like acetone and petroleum ether.

An acceptable orange flavour is obtained by a judicious blending of the above three raw materials based on the objective and subjective analyses. One should take care to see that either the raw material or the processed oil is free from any foreign or off-odours.

Flavour: Base-A: This is prepared by mixing of colour, gum, flavour preservative and other additives followed by homogenisation and packing in glass bottles upto the brim.

Flavour Base-B: Citric acid and sodium citrate are mixed well and packed in HDPE bags.

Flavour Base-C: This consists of sodium benzoate packed in HDPE bags.

(b) Lemon-Lime Flavour Composition

Flavour Base-A: This is prepared by blending proper proportions of lemon, lime processed by alcohol solvent extraction, chromatographic and fractional distillation methods. The flavour should be free from any foreign or off odours.

The above flavour blend is homogenised using gum, water, preservative and other additives and packed in glass bottles.

Flavour Base-B: This consists of citric acid and sodium citrate packed in HDPE bags.

Flavour Base-C: This consists of sodium benzoate packed in HDPE bags.

No specifications exist for the flavour blends. However, there are specifications for the finished beverages like water quality, acidity, sweetness, gas volume etc.

The work has been carried out on laboratory scale. The institute has prepared one unit of the flavour blends which can yield 10,000 bottles.

Inputs - Utilities: Power 100 kwh/day
Water 5000 lit/day

The main raw materials required are gum acacia, orange colour, citric acid, sodium citrate, sodium benzoate, butylated hydroxy toluene, silica gel, petroleum ether, acetone, sodium sulphate, orange, lemon and lime oils, ethanol, etc.

All these items are available indigenously. However, part of gum acacia and citric acid are imported.

The main items of equipment required are homogeniser, water softener, stainless steel vessels, distillation unit, pumps etc. All the above items are available indigenously.

Plant Parameters:

Production capacity: 4 Units of orange and 5 units of Lime-Lemon flavour blend/Day

Number of shifts: One per day

Investment(excluding land & building) - 1.5 lakhs

Area Required:

| | |
|---|---|
| Total | 400 sq.m. |
| Covered | 200 sq.m. |

Manpower Requirements:

| | |
|---|---|
| Managerial | 1 |
| Technical | 2 |
| Others | 3 |

The product has been tested by M/s.Spencer & Co.,Madras and others and reported to be good and acceptable. The products have also been tested in the laboratory and found good, acceptable and superior to commercially available samples.

# New Machinery and Equipment

## CHEMICAL PROCESS EQUIPMENT

### Dry Colour Mixing Machine

Pimco dry colour mixing machine Model PDM-50 is for dry blending of plastic granules. It can mix 2 bags of plastic granules of 25 kg. each at a time. The machine reduces loss of pigment, gives efficient and homogeneous mixing, saves labour and time because it can mix 50 kg. material within 10 minutes. It is easy to operate. The two-in-one mixer can feed two moulding machines at a time. Timer for automatic stoppage of the machine is provided. Also available are plastic scrap granulators.

For further information write to: Pioneer Manufacturing Corporation, 119, Veena Dalvai Industrial Estate, S.V. Road, Oshiwara, Jogeshwari (West), Bombay - 400060.

### PVC Extruder and Wire Coating Machine

The manufacture of 65 mm. P.V.C. extruder & wire coating machine by Indo-Japanese Prototype Development & Training Centre, Howrah, is the result of a rational step forward towards fulfilling the needs of the cable industry. The 65 mm extruder is being produced under the technical know-how from M/s. Yamakawa Tekko Co. of Japan. The machine is of a practical design of medium speed and high durability and is perfectly suitable for use both in small and large scale sector of industries.

Specifications:

Capacity:

| | | |
|---|---|---|
| 1. | Extrusion Capacity | 80 kg./hr. |
| 2. | Dia. of Coated Wire (Single) | * 3.2 mm. to 11.4 mm. |
| 3. | Production Capacity | 15 to 160 metre/min. |

* For multi core conductor, the diameter varies according to the secondary insulation thickness and volumes.

Extruder:

| | | |
|---|---|---|
| 1. | Centre Height | 1000 mm. |
| 2. | Dia. of Screw | 65 mm. |
| 3. | L/D Ratio | 22:1 |

| | |
|---|---|
| 4. Compression Ratio | 3:1 |
| 5. RPM of Screw infinitely variable with remote control arrangement | 17.5 to 70 rpm. |
| 6. Hopper capacity | 50 kg. |
| 7. Cooling screw & feeder end | Water cooled |
| 8. Motor | 11 KW |
| 9. Heating capacity | Total 13.6 KW.Max<br>(a) 3KW x 4 Zones<br>(b) Cross Head 1.2 KW<br>(c) Die....0.4 KW |

Supply:

Single spool type with tension adjusted

| | |
|---|---|
| 1. Spool Dia. | 500 mm |
| 2. Flange Dia. | 850 mm |
| 3. Spool Width | 600 mm |
| 4. Loading & unloading | Manual with rapid replacement arrangement |

Wire Straightner:

10 Roller Type

Electricals:

Supply:

| | |
|---|---|
| (a) Motors Extruder | 400/440 V, 3Ph. 50 Cycle |
| i) Drive | 11 KW |
| ii) Speed Variator | 0:1 |
| (b) Take Up | |
| i) Drive | 3.7 KW |
| ii) Variator | 0.1 |
| (c) Heaters | |
| i) Cylinder (Band Heaters) 4 x 3 KW | 12 KW |
| ii) Cross Head...Cartridge 8 x 15 0W | 1.2 KW |
| iii) Die Heater 1 x 400 W | 0.4 KW |

(d) Recirculating Water Pump (Optional Equipment).... 0.75 KW Total Max. Power Requirement Approx...30 KW

Cooling:

| | |
|---|---|
| Cooling Water Through... | 7300 mm length |

Take Up Equipment:

|  |  |  |
|---|---|---|
| 1. | Capstan Dia | 750 mm |
| 2. | Take up speed infinitely variable | 15 to 160 metre/min |
| 3. | Speed Variator | 4 Speed gear box and variator with electrical remote control arrangement. |
| 4. | Motor | 3.7 KW |

Winding Equipment:

Single spool Type

|  |  |  |
|---|---|---|
| 1. | Spool Dia | 500 mm |
| 2. | Flange Dia | 1050 mm |
| 3. | Spool Length | 600 mm |
| 4. | Tension arrangement | Adjustable intensity Electromagnetic brake |
| 5. | Traverser | Adjustable pitch, constant stroke |

Standard Accessories:

|  |  |  |
|---|---|---|
| 1. | Die & Nipple | 1 Set of 6 sizes |
| 2. | Length Indicator | 1 |
| 3. | Spools | 2 each for supply and winding |
| 4. | Setting Tools | 1 set |
| 5. | Foundation Bolts | 1 set |
| 6. | Operators Hand Book | 1 |

The Indo-Japanese Prototype Production and Training Centre had earlier introduced its 45 mm PVC extruder and wire coating machine produced under a licence from M/s. Yamakawa Tekko Ltd. of Osaka, Japan.

Manufactured By:

Prototype Development &
Training Centre
(Indo-Japanese Collaboration)
The National Small Industries
Corporation Limited
(A Government of India Undertaking), Balitikuri, Howrah

Enquiries to:

The National Small Industries Corporation Limited
(Marketing Division)
(A Govt. of India Undertaking) Near Industrial
Estate, Okhla
New Delhi - 110020

## Sugar Plant Maintenance Kit

Sugar plant machinery and equipment are subjected to severe vibration and shock in addition to contact with corrosive sugar juice. As a result, problems like loosening of fasteners in cane carriers, cutter knives falling, hopper bolt nuts working out loose, centrifugal bearing failure, leakage through pneumatic control couplings, and red gasket joints are prevalent. Consequences are damage to mill, hampered crushing, service and part replacement cost.

Anabond Corporation have brought out a special kit to rectify and eliminate these problems. The special adhesives and sealents kit are made to suit specific requirement. They are simple to understand and adopt. They reduce service costs, reclaim otherwise rejected parts, prolong service life and sustain production. Further information can be had from Marketing Coordinator, Anabond Corporation, 13 Avenue Road, Madras - 24.

# ENGINEERING EQUIPMENT

## Hand-Operated Wire-Cutting Machine

United Industries, Jamnagar, manufacture hand-operated wire-cutting machines. The machine is able to cut any type of material such as iron/brass/copper/aluminium. Cutting range extends from 1 mm to 4 mm diameter. The machine is also recommended for cutting the wire in length from 5 mm to 60 mm. The weight is approximately 1,650 g.

For further information write to: United Industries, 57 Digvijay Plot, P.O.Box. 5026, Jamnagar, Gujarat - 361001.

## Moulding Presses from 30 tons to 1000 tons

Hydraulic high speed, down stroke presses with self contained oil pressure pump for manufacturing of mouldings of plastics, rubber, ceramics, abrasives etc., as well as for mechanical purposes such as forming, drawing, press fitting, forging, upsetting etc., are being manufactured by Sterling Hydraulic.

The presses are of steel welded construction with high grade cast iron platens. The top platen slides in adjustable guides. The self-contained high pressure pump which is of the glandless three plunger type, operates only while giving pressure or on opening the die. An adjustable limit switch automatically cuts off the power when opening the die, thus saving 50% to 70% of power.

A single hand controlled hydraulic valve assembly operates the press. It regulates the descent of the platen, operates the pump to give pressure, relieves the pressure and operates the

Specifications:

| | | | | | | |
|---|---|---|---|---|---|---|
| Max. closing pressure - in tons | 30 | 60 | 100 | 150 | 250 | 400 |
| Max. opening pressure in tons | 6 | 12 | 20 | 28 | 50 | 80 |
| Max. ejecting pressure in tons | 2 | 3 | 4 | 5 | 10 | 16 |
| Platen size | 380 mm x 305 mm | 510 mm x 460 mm | 585 mm x 510 mm | 710 mm x 610 mm | 810 mm x 660 mm | 1020 mm 810 mm |
| Max. stroke of piston | 280 mm | 330 mm | 355 mm | 380 mm | 455 mm | 610 mm |
| Max. distance between platens | 560 mm | 610 mm | 610 mm | 660 mm | 810 mm | 1020 mm |
| Max. ejector stroke | 125 mm | 150 mm | 165 mm | 175 mm | 205 mm | 280 mm |
| Diameter of piston | 114.3 mm | 152.4 mm | 203.3 mm | 254 mm | 317.5 mm | 406.4 mm |
| H.P. of motor | 2 | 3 | 5 | 7.5 | 7.5 | 10 |
| Upward speed of piston | about 25 mm per second | | 5 | 7.5 | 7.5 | 10 |
| Downward speed of piston | about 38 mm per second | | 5 | 7.5 | 7.5 | 10 |
| Speed under pressure | about 3 mm per second | | 5 | 7.5 | 7.5 | 10 |

| | | | | | | |
|---|---|---|---|---|---|---|
| T-Solts in platen to take standard T-bolts | 12 mm | 16 mm | 20 mm | 24 mm | 24 mm | 24 mm |
| Quantity of oil required | 16-litres | 30-litres | 36-litres | 55-litres | 100-litres | 200-litres |
| Weight (Approx) | 1-ton | 1.75 tons | 2.5 tons | 3.25 tons | 5.5 tons app. | 9 tons |
| Max. operating pressure | 315 kgs/cm$^2$ | | | | | |

For furtherinformation contact:

Sterling Hudraulic Company. 142-146, Swami Vivekanand Road
Jogeshwari, Bombay-400060.

pump to raise the platen. This valve assembly is fitted with appropriate non-return valves and an adjustable pressure limiting valve, which enables holding of platen on open stroke, holding of pressure and impressing the required pressure. Ejection can be effected either automatically on opening the die or normally by hand lever. 150 ton presses are supplied with automatic ejectors only. An air charge accumulator at the top regulates the downward stroke of the piston.

The presses are supplied as complete units fitted with self contained pump, motor, starter, oil reservoir, control valves, connecting pipes, pressure gauge etc., but without oil. The lowest adjustable pressure on each press will be about 30% of its maximum capacity.

## Multiplaten Hydraulic Presses

Sterling Upstroke multiplaten presses are end or side loading type with multi-hydraulic cylinders to give even pressure for moulding and consolidating plastics and synthetic resin bonded paper and fabric laminates.

The body of the press will be of heavily fabricated welded steel-one-piece construction upto 2500 mm platen length and of two welded steel-one-piece ring bodies keyed and bolted together if the platen length is more than 2500 mm. The top bolster and the moving platen will be of fabricated steel in one piece and will be internally reinforced at the pressure positions to give even pressure and negligible flexing so as to preserve excellent alignment of intermediate platens. The bodies will be stress relieved to prevent distortion.

The cylinders will be of cast steel with heavy bronze neck ring and gland ring with chevron type packings. Rams will be ground honed and hard chrome plated to give a long packing life.

The straightness of the top bolster, bottom platen, and intermediate steam heated and water cooled platens will be within .07 mm for platens upto 2500 mm long and .01 mm for platens over 2500 mm long. Therefore, the maximum tolerance between closed platens will be .015 mm for platens upto 2500 mm and .02 mm platens over 2500 mm long. Also the thickness of heated platens will not vary more than .015 mm for platens upto 2500 mm and .02 mm for platens over 2500 mm long.

Platens upto 2500 mm long will be bored for centre inlet of steam on the broad side and two outlets on each end on the opposite side. Platens over 2500 mm long will be bored for two inlets on the broad side and three outlets on the opposite side. The platens will be grouped so that on each side of the press the inlets and outlets alternate on the successive platens thus ensuring uniform heating of the boards.

The platens will be connected to inlet and outlet headers with braided flexible steam.

The hydraulic system will consist of a low pressure pump, two high pressure pumps, push button controlled solenoid operated pilot valves, unloader valve, pressure limit valve, pressure relief valve etc. A high H.P. motor will drive the low pressure pump to close the press at a speed of about 1525 mm per minute and to take the full pressure after unloading the low pressure pump. On reaching the set pressure, the high H.P. motor will automatically stop and the second small high pressure pump coupled to a small H.P. motor will continue to maintain pressure.

The operation of the press is push button controlled including starting and stopping of the motor which takes place automatically. The press can also be raised, lowered, stopped or inched at will by push buttons.

The heated platens will be insulated from the top bolster and bottom platen by double insulating boards.

The pumps, oil reservoir, control valves etc., will be mounted on top of the press and the control panel on the side of the press or as desired.

The press will be supplied complete with pumps, motors, starters, oil reservoir, connecting pipes, braided flexible steam hoses, headers, pressure guage, pressure limit switch etc., but without first filling of oil.

Typical Specifications:

| | | | |
|---|---|---|---|
| Max. Pressure | 3000 Tons | 1000 Tons | 5000 Tons |
| No. of cylinders | 6 | 1 7 | 8 |
| Dia of Rams | 457.2 mm | 635 mm | 550 mm |
| Platen size | 2540 mm x 1300 mm | 1300 mm x 1300 mm | 3200 mm x 1300 mm |
| No. of Heated Platens | 13 | 9 | 13 |
| No. of Daylights | 12 | 8 | 12 |
| Height of each daylight | 100 mm | 75 mm | 100 mm |
| Stroke of Rams | 1200 mm | 600 mm | 1200 mm |
| Motor H.P. | 1) 20<br>2) 2 | 15<br>1 | 1) 30<br>2) 2 |

For further information contact:

Sterling Hydraulic Company., 142-146 Swami Vivekanand Road,
Jogeshwari, Bombay - 400060.

## PRESS-BRAKE - 25 TONS

The frames bed of amply dimensioned plate-material provides great margin of safety even at maximum load. The arrangement will allow the bending of sheets of any length in width corresponding to the clear distance between the housings, at angles upto 90°.

The height of the ram can readily be adjusted by a hand-wheel via high grade worm gear drive on spindles with trapezoidal thread. Through one sided disengaging of the connecting shaft, the ram may easily be adjusted to parallelism. The pointer arranged on the right hand housing clearly shows the position of the eccentric at any one time. The eccentric shaft, intermediate shaft and main shaft run in bronze bearings and are secured against deflection or torsion by ample dimensioning.

High speed main drive gears run within an enclosed gear box in oil bath. The fly wheel has been so designed and accurately balanced that it gives vibration-free drive even when the belt pulley yields a very high moment of inertia. A high grade multiple disc clutch serves as control member being actuated by a pedal in conjunction with a hand brake. The control is accomplished mechanically. Adjustable guide gibs ensures exactly parallel guiding of the ram. The convenient arrangement of the lubricating grooves facilitates the spreading of a sufficient oil film over the surfaces involved, in any position of the ram.

The drive motor may be switched forward and return running. The adjustable disposition of the drive motor facilitates easy retightening of the V-belt. Two front supports on the bed in conjunction with the two adjustable stops at the rear ensure good application of the sheets and absolutely parallel performance of the bending operations. The die bolster is always accurately adjustable to the ram by the adjusting device attached to the end. All gears and rotating parts are covered with guards, making the machine absolutely safe for operation.

Specifications:

| | | | | | |
|---|---|---|---|---|---|
| Tonnage | 25 tons | | Throat clearance from centre of Dies | 230 mm | 9 Approx. |
| Length of bed and ram | 1830 mm | 72" Approx. | Horsepower (Motor) | 3 HP | |
| Clear distance between housing | 1575 mm | 62" " | Frame plates | 25 mm | 1" " |
| Capacity (M.S. on full bed) | 16 kg. | | Bed plates | 20 mm | 3/4" " |
| Stroke of ram | 50 mm | 2" " | Ram plate | 40 mm | 1½" " |
| Ram adjustment | 75 mm | 3" " | Floor space | 217x1200 mm | 82.5%x47. |
| Shut height ram stroke down | 230 mm | 9" " | Height<br>Nett weight | 2560 mm<br>3.2 m tons | 101" " |

Manufactured by

Prototype Development and
Training Centre
(Indo American Collaboration)
National Small Industries
Corporation Limited
(A Govt. of India Undertaking)
Aji Industrial Estate, Rajkot.

**For Enquiries:**

**Marketing Division**
**The National Small Industries Corporation Limited**
**(A Govt. of India Undertaking)**
**Near Okhla Industrial Estate**
**New Delhi - 110020**

Swing-arm cutting Press

Ease and safety of operation are claimed as outstanding features of an electro-hydraulic swing-arm cutting (Clicking) press developed by a British firm for use in the footwear and other industries.

The press is available in two version - models CW 116 and CW 120 - providing cutting forces of 16 and 20 tonnes with motors of 1.1 KW and 1.5 KW (1.5 and 2 hp) respectively. In addition, each model can be supplied with cutting arm widths of 380 mm, 500 mm or 600 mm, giving users a choice of six cutting force/arm width combinations to suit their particular requirements.

Controls, illustrated by easy-to-follow graphic symbols, are conveniently mounted on the light, low-friction swing arm. The cutting stroke can be adjusted between 10 mm and 100 mm and both stroke adjustment and the operation of the press itself are electronically controlled. The press can operate only when the touch button controls incorporated in the left and right handles on the cutting arm are touched simultaneously ensuring both safety and easy control.

Apart from cutting natural and simulated leather for the footwear industry, the press can be used in the manufacture of a wide variety of other items produced by the leather goods industry, such as belts, gloves, handbags cases and soft toys. Applications in other industries are equally wide, ranging from cutting gaskets and interior trim for motor vehicles to cutting textiles and a variety of other natural and synthetic materials for the clothing, upholstrey, flooring and stationery industries.

Manufacturers: Cox and Wright Ltd., P.O. Box 27, Wellingborough Road, Rushden, Northamptonshire, NN10 9BD, England.

## MACHINE TOOLS AND ACCESSORIES

### Pillar Type Drilling Machine DP20

It is suitable for piece work as well as multiple production in both large and small workshops. Drilling, reaming and tapping in all kinds of materials are possible.

Head stock has vertical as well as rotary movement on the column. Gear box is driven by a flange mounted electric motor. Spindle speeds are selectable by two hand levers. Power feeds are engaged by a hand lever and started and stopped by the lever of an automatic clutch which automatically disengages the feed when the maximum thrust on spindle exceeds 400 kg. i.e., when the tool becomes blunt or breaks or when the set stop is reached. Both millimeter as well as inch scale are provided for depth setting. The spindle runs in ball bearings and returns to its upper position by the action of spring. The head stock is lubricated by a screw pump. The end of the spindle is fitted with a flange for mounting of a multispindle head or turrent drilling head when required.

Main Specifications:

| | |
|---|---|
| Drilling dia in steel (Max) mm | 20 |
| Taper in spindle (inside) | MT-3 |
| Depth of Drilling mm | 160 |
| No. of feeds | 8 |
| Range of speeds RPM | 90-2240 |
| No. of feeds | 3 |
| Range of feeds mm/rev | 0.12-0.32 |
| Spindle axis to column face mm | 250 |
| Spindle nose to table (max.) mm | 640 |
| min mm | 0 |
| Spindle nose to base-max mm | 1120 |
| min mm | 500 |
| Clamping area of table mm | 280 x 350 |
| Clamping area of base mm | 350 x 450 |
| Head stock traverse mm | 360 |
| Table traverse mm | 400 |
| Spindle torque (Max) kg m | 400 |
| Drive Motor | 1.5 |
| Approx Weight Kg. | 540 |

For details contact: Central Machine Tool Institute
Tumkur Road, Bangalore-560 022.

### Precision Tool Room Lathe:

The precision tool room lathe produced by the Prototype Development & Training Centre, Okhla, has been specially designed for most modern light engineering industries for producing extra precision work.

Its precision, its versatility and its complete range of accessories make the machine an indispensable equipment for any modern tool room.

The head stock is of extremely robust construction and houses the strong, accurate and smooth running drive elements. It is rigidly mounted on the 'V' and the flat of the bed. The case hardened and ground Nickel chromium steel main spindle runs in a pair of specially matched, preloaded precision taper roller bearing in the front end and a heavy bronze bearing at the rear end. The lubrication is fool-proof and it is practically impossible to run it dry.

Model 006 is supplied with the intermediate gearing arrangement for changing of speeds whereas in the Model 001 the speeds are required to be changed by shifting the belt from one pulley to another, manually.

In case of model 006, 18 spindle speeds in geometrical progression are obtained through gear change and 16 spindle speeds can be had in Model 001 by shifting the belt manually. The spindle can hold chucks face plates or collets directly.

The bed, made of extra close grain cast iron having a hardness at the guide ways as much as HB 220, is naturally seasoned, accurately machined and scrapped. It has a strong box section and is diagonally ribbed. Independent 'V' and flat ways have been provided for the saddle and the tail stock.

The saddle with the cross and compound slide, slides smoothly but without play on the bed. Ample bearing area has been provided to ensure minimum of bearing pressure and thus minimum wear. Back-lash eliminating devices have been incorporated for both cross-slide and compound slide screws.

The heavily constructed tail stock can be clamped at any position of the entire length of the bed on its own guide way. The tail stock sleeve slides into its accurately honed bore and maintains the geometrical position throughout its travel. Quick clamping arrangements have been provided for the tail stock as well as to the sleeve.

Drive

Model 006: A 1.5 HP totally enclosed motor is suitably housed in left pedestal. Torque is transmitted through a 'V' pulley to the speed gear box housed in the pedestal from where it is again taken to 'V' pulley on head stock spindle.

Model 001: A 1.5 HP totally enclosed motor is suitably housed in the left pedestal. Torque is transmitted over a pair of 'V' belts of the head stock.

Contactor with over load no volt release has been provided for the protection of the motor in both the above models.

A huge selection of feeds and threads can be obtained through the well designed Norton type gear box. Pick off gears have also been provided to increase the range. Feed tripping arrangement is an added feature.

A portable coolant equipment with its own pump and fittings is supplied with the machine.

Fixed steady, travelling steady, turret tool post, collet equipment, etc., can be supplied with the machine on request.

Manufactured by

Prototype Development and
Training Centre
(Indo German Collaboration)
The National Small Industries
Corporation Limited
(A Govt. of India Undertaking)
Okhla, New Delhi-110020.

For Enquiries: Marketing Division: ...

The National Small Industries
Corporation Limited
(A Govt. of India Undertaking)
Near Okhla Industrial Estate
New Delhi - 110020.

# Industry Roundup

This section highlights policies and procedures, guidelines, the present status and future prospects in certain industries as well as the latest available data in respect of such industries.

## ALCOHOL INDUSTRY

### 0. Introduction

Alcohols are hydroxyl derivatives of hydrocarbons. The physical and chemical properties of the alcohols, thereby, their applications and uses are dependent primarily upon the hydroxyl group. Out of many aliphatic, alicyclic and aromatic alcohols, ethyl alcohol has an important role in industry as one of the basic building blocks. It can be used as starting material to manufacture number of products, such as, Acetic acid, Acetic anhydride, Acetone, Butanol, Butyl/Ethyl acetate, Polyethylene, Styrene, PVC etc., which are of vital importance in the modern age. Alcohol industry in India is not new. Its origin dates back to ages.

### 1. Present Status of the Industry

At present there are about 120 distilleries in India with a combined installed capacity of about 666.5 million litres per annum. The production-pattern of alcohol in India is as given in the table.

PRODUCTION OF ALCOHOL

| Year | Quantity Million Litres |
|---|---|
| 1974-75 | 400.10 |
| 1975-76 | 408.09 |
| 1976-77 | 445.23 |
| 1977-78 | 500.00 |
| 1978-79 | 437.90 |
| 1979-80 | 405.91 |

This production pattern represents 66% utilization of the installed capacity. On the one hand, distillery capacity is under utilized while on the other alcohol based industries continue to complain the inadequate availability of alcohol leading in turn to underutilization of their capacity and a little quantity of denatured alcohol is being imported.

## 2. Government's Policy

In India the main raw material used for the production of alcohol is molasses. Hence the establishment of new alcohol unit depends on the availability of molasses. More distilleries of alcohol could be set up in the sugar producing states subject to the certification by the state excise commission that sufficient quantity of molasses could be made available to the proposed unit without disturbing the interstate allocation of molasses made from that state to the deficit states by the government from time to time. Setting up of an economic size distillery or expansion is considered subject to the aforesaid provisions. The manufacture of ethyl alcohol for laboratory purposes is exclusively reserved for small scale sector.

## 3. Manufacturing

Alcohol can be manufactured starting from different materials.

### 3a. From Molasses

Black strap or high test molasses is charged into a mixing tank, where it is diluted with sufficient warm water to give a sugar concentration of 10-15%. Sulphuric acid is added to reduce the pH of the molasses from about 5.3 to 4.0 and 5.0, depending on plant practice. Most of the blackstrap molasses does not require the addition of nutrients. However high-test molasses requires considerable quantities of ammonium sulphate and other salts, such as, phosphates.

The diluted, acidified molasses, called mash is run into large wooden or steel fermentation tanks, where a selected strain of yeast is added. In the fermenters, reaction takes place at 20-30°C. Since the reaction is exothermic, cooling coils or sprays are generally used. However near the end of the fermentation, the temperature may be as high as 38°C. The yeast supplies the enzyme invertaze which catalyzes the hydrolysis of sucrose and produces the enzyme zymase which converts the monosaccharide to alcohol and Carbondioxide.

After the fermentation reaction is completed, the liquor, now known as beer and containing 8-10% alcohol is withdrawn from the fermenters and further processed to get 95% alcohol.

### 3b. From Maize

Alcohol can be manufactured from maize. The essential steps are as follows:

1. Milling of grain to reduce particle size and then mixing water
2. Treatment with enzyme alphaamylase to break up starch to small chains at a temperature of 66°C-80°C for 4/5 hours
3. Further treatment of this solution with beta-amylo glucosides for about 4 hours at 60°C to convert to mono saccharides
4. Filtration and dilution with water for fermentation with yeast
5. Distillation of alcohol from fermented liquor.

The cost of alcohol manufactured from Maize is estimated at ₨ 3.04/litre.

### 3c. From Potatoes

Raw potatoes contain 78% water and 19.68% starch. The essential manufacturing steps for alcohol from potatoes are the same as from maize. Only raw potatoes are sliced in a chopping machine and then mashed with water under hot condition before treating with enzyme.

### 3d. From Ethylene

The most recent synthetic alcohol process is the direct hydration of ethylene over a phosphoric acid catalyst. In recent years this process has dominated the manufacture of industrial ethanol accounting for 83% of production in 1973.

### 4. Constraints for better production

Since ethylene is a soarce raw material in India, Molasses has dominated the scene. Enough and accurate data is not available to determine the exact quantity and quality of molasses used for conversion into alcohol. But it is evident that the actual production of alcohol is considerably lower than the potentiality possible and for such lower production the following factors are responsible.

1. Inadequate storage facilities
2. Loss of alcohol in the settled yeast sludge which is not recycled and is discarded
3. Less operating efficiencies
4. Inadequate temperature control during fermentation of molasses
5. Contamination of yeast culture
6. Entrainment of alcohol with $CO_2$ let off from the open fermenters
7. Equipment defects.

## 5. New Technologies

The following indicates the improvement possible with proven advanced technology:

a. Continuous fermentation

b. Use of specially active, flocculating yeast strains

c. Molasses pre-purification

d. Monitoring and control of fermentation temperature, nutrient concentration, molasses input by means of microprocessors and other instrumentation networks.

High grade research incorporating these features is available from Uhde and Hochest of Germany and Vogel Busch of Austria for technology transfer in the revamping of existing distilleries or construction of new ones to realise higher yields, lower costs and higher productivity of equipment. It is worth while importing the technology on a national level and making it available to all distilleries.

## 6. Plant & Machinery

At present the plant & machinery required for distilleries are all indigenously fabricated.

## 7. Use Pattern

Alcohol being the basic raw material for the manufacture of number of chemicals and allied products, is consumed in the following pattern.

| | |
|---|---|
| Chemical manufacture | 26% |
| Toiletries and cosmetics | 20% |
| Acetaldehyde | 14% |
| Industrial solvent & thinners | 12% |
| Detergents, flavours & disinfectants | 10% |
| Miscellaneous | 18% |
| | 100% |

## 8. Demand

As has already been mentioned alcohol based industries are facing difficulties. The demand pattern of alcohol is as follows:

**Demand pattern**

| Year | Quantity | Units |
|---|---|---|
| 1985-1986 | 775,500 | KL |
| 1990-1991 | 1163,200 | KL |

This demand is only for chemicals based on alcohol. The other applications like beverages, gasohol and laboratory are not taken into account to arrive at this figure and it was worked out that the chemicals manufactured from alcohol are cheaper than those derived from petroleum refineries.

## 9. Conclusion

It can be concluded that in these days of high petrol prices alcohol is the cheapest source for the sugarcane growing developing country like India whose foreign exchange reserves are draining out in the process of importing petrol. (MSR)

# Current Technical Literature

Copies of articles/documents listed in this section are available on payment of ₨ 5/- for the first 5 pages or part thereof and Re 1/- for every subsequent page of the photo copy or xerox copy of the article/document. While placing the order, please mention the CTL number of the SENDOC Bulletin.

| Subject Index | CTL Nos. |
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| Soaps and Detergents | 323-325 |
| Surface Coatings | 326-331 |

# CURRENT TECHNICAL LITERATURE

## RESOURCES

### Energy Sources

301. BUCHEL, K.H.: Agricultural products - Raw material and energy source of the future. Chemistry International, 1980, (5), 17-23.

Coal and agricultural products are most likely to follow petroleum as primary sources of the chemical feedstocks as fuels. The speed and extent at which they replace petroleum will depend largely upon the price of oil and the ease with which they are converted into basic chemicals that fit into present petrochemical processing systems.

A major advantage of oil as a feedstock for the chemical industry has been that a few simple chemical components can be produced in large, centralized, highly economical petrochemical refineries. These compounds can, in turn, be converted into a wide variety of chemical products.

Developments in coal chemistry are moving towards gasification and liquefaction to carbon monoxide, hydrogen and hydrocarbons. These can be converted into a multitude of chemicals and fuels by conventional techniques.

So too for agricultural products - biomass - it is a question of finding processes that produce basic chemicals such as ethanol, ethylene, methanol or simple aromatics.

302. PAUL, S & JHA, P.S.: Alternative energy sources. Chemical Weekly, 1980, 26(4), 53-55.

Explains the manufacture of methanol & ammonia from fuel wood and gas. Highlights the need to develop forests as alternative source of energy. (MSR)

303. POCRNJA, A.: Rational production of energy from medium temperature and high temperature. Chemical Engineering World, 1980, 15(6), 39-47.

A process is presented with steam as the operating medium for power generation from high-temperature and medium-temperature heat. (BS)

304. RELDMANN, H.F et al: Conversion of forest residues to a clean gas for fuel or synthesis. TAPPI, 1980, 63(5), 83-87.

Two novel developments have the potential to reduce the cost of gas from forest residues or other biomass materials. The first of these is the finding that wood ash itself enhances wood's gasification reactivity. The second development is the application of a novel reactor system that allows a wide range of forest residues ranging from sawdust to wood chips to be gasified at high throughputs without preprocessing techniques such as grinding or pelletizing. Results of a preliminary cost evaluation indicate that a clean transportable gas suitable for either chemical synthesis or fuel can be produced at a cost competitive with other clean fuels.

305. TYAGI, P.D.: Energy crisis and hydrogen fuel. Chemicals & Petro-chemicals Journal, 1980, 11(6),21-25.

Reviews the world energy scene and examines the possibilities of using hydrogen as fuel. Highlights the present supply and future prospects of hydrogen. (BS)

## AGRO INDUSTRIES

306. CHELLAPPA, S. & SRINIVASAN, D.: Wealth from agricultural waste. Indian Chemical Journal, 1980, 1[illegible](6), 27-30a.

Explores the various possibilities of utilizing the agricultural wastes in producing valuable products like food, fuel, fertilizer etc. (MSR)

307. CLARK, S.P et al: Pilot plant production of sunflower seed flour. Journal of the American Oil Chemists Society, 1980, 57(3), 275A-279A.

Describes the pilot plant production of flour from hull-tree prepressed kernels from confectionery type sunflower seed. Discusses the various aspects of production with the help of tables showing important observations.

308. VIMAL, O.P.: Neem seed: Source of oil, medicinals, pesticide, feed & manure. Chemisphere, 1981, 5(35), 31-33.

Describes the utilization and applications of neem seed in soap, medicine, pesticides, fertilizers and fodder. Presents the potential of neem seed available in India. Highlights the problem areas such as collection of seeds etc. (MSR)

## PAPER, PULP AND ITS PRODUCTS

309. -----: New developments in pulp paper, newsprint and board making. Paperprintpack India, 1979, 17(13), 8,10,12,14,17,18,20,22,24,26 & 28.

Enumerates different technological developments.

310. -----: World paper industry. Paperprintpack India, 1979, 17(13), 63-86.

Reviews the status of the paper industry in terms of production, demand, international trade etc. (BS)

311. BAUER, C.E.: New products for paper making. Paperprintpack India, 1979, 17(13), 31,32,34,36, 38,40,42,44,46,49,50,52,54,55,56,57,58 & 60.

Enumerates the features of different machines developed for paper making.

312. BUSCH, T.W.: Coated paper production and productivity. TAPPI, 1980, 63(5), 45-47.

Coated paper production and productivity have increased significantly during the past 25 years. Possible causes for a declining rate of productivity are discussed. The coated paper industry has an opportunity and a challenge for the future. Real increases in productivity for the next 25 years are believed to be necessary for still further penetration of coated paper into the uncoated paper market. The significant progress of the past forms a solid basis for even greater advances in the years ahead.

313. FITCH, J & WOOD, W.R.: The fundamentals of paper mill maintenance. TAPPI, 1980, 63(12), 31-34.

## PACKAGING

314. CHATTERJEA, B.D.: Innovations in flexibles for unit packaging. Perfectpac, 1980, 20(11), 6-12.

Reviews the new trends in flexible packaging which have taken place in industrially developed countries during the last decade and its probable impact on the Indian scene in the coming years. Covers the topics-plastic films, laminates and co-extruded compositions. (BS)

315. DAY, F.T.: The choice and application of wrapping papers. Confectionery Production, 1980, 46(6), 284-285.

Discusses the applications of gassine, grease proof and twisting papers. (MSR)

316. VOSS, H.J.: Application range of cold seal adhesives in flexible packaging films. Perfectpac, 1980, 20(11), 13-16.

317. WILKINS, D.R: Developments in labelling and presentation of soft drink bottles. Paperprintpack India, 1980, 18(7), 38,40.

The last ten years has seen dynamic developments in the soft drinks industry. The most significant change has been rapid increase in the use of the non-return bottle. Machine speeds have risen dramatically and this has brought in its wake a large number of problems. The rapid rise of supermarket retailing has led to a demand for the high standard of presentation which this form of selling requires.

## CHEMICAL INDUSTRIES

318. -----: Dyes and dyes-intermediates-problems and prospects for the eighties. Industrial Researcher, 1981, 7(4), 237-243.

Analyses the present status of the industry, its growth and pinpoints the problems involved. Considers the prospects of seven important dyes and four major dye intermediates in the eighties vis-a-vis the growth of the main end-use industries such as textiles, paints, paper, leather and other industries. (JBS)

319. -----: Market for textile auxiliaries. Industrial Researcher, 1981, 8(1), 75-79.

Examines the scope for textile auxiliaries in general as well as some specific auxiliaries, viz., sodium alginate, guar gum, carboxy methyl cellulose and ethylene oxide condensates. (JBS)

320. -----: Statistical profile on textile auxiliaries. Production data of some selected textile auxiliaries used in various operations. Industrial Researcher, 1981, 8(1), 74.

Gives data on number of units, installed capacity and production for 1976, 1977 & 1978.

321. BHATIA, Y.S.: Production of ethanol from plant biomass. Indian Chemical Journal, 1980, 15(6), 31-36.

Utilization of plant biomass for the production of ethanol involves the depolymerization of polysaccharides by chemical, biological or physical methods. Reviews various processes which have been developed, involving multistage conversion and direct conversion of the cellulose to ethanol. (MSR)

322. SUBRAMANIAN, N & SIVAPRASADA RAO: Studies on the deionization of sodium silicate. Indian Chemical Journal, 1980, 15(6), 37-38.

A process for the deionization of sodium silicate with ion exchange resins to obtain silica gel is investigated.

## SOAPS AND DETERGENTS

323. BARRET, J.H.: Laundry Aids: Tools for the washing alchemist. (Part I). Household & Personal Products Industry, 1980, 17(9), 58,61,63,65.

Gives the consumers and market for the laundry aids. Highlights the characteristics of laundry bleach and fabric softeners. (BS)

324. BARRETT, J.H.: Laundry Aids: Tools for the wash day alchemist. (Part 2). Household & Personal Products Industry, 1980, 17(10), 42,44,46.

In contrast to the few simple laundry aids available to our grand-mothers, today's washday alchemist finds over a hundred products from which to choose. The soap and detergent industry has responded with alacrity to new consumer needs resulting from changes in our technology, culture and standard of living and laundry aids now are a dynamic part of the total consumer products market. (BS)

325. UNGER, L.: World consumption of soaps & detergents 1970-1978. Washing, cleansing and scouring products. Soap, Perfumery & Cosmetics, 1980, 53(10), 581-583 & 585.

## SURFACE COATINGS

326. -----: New industrial paint technology. Paintindia, 1980, 30(8), 23-24.

Briefly discusses about electrocoat which is a water-based paint designed to provide maximum corrosion resistance.

327. -----: Paint industry - a demand analysis. Industrial Researcher, 1981, 8(1), 53-57.

Reviews the present status of the industry including the role of the small scale sector, discusses factors inhibiting the growth of the industry and provides estimates of demand and supply of paints for 1983. (JBS)

328. -----: Pre-treatments for powder coatings. Pigment and Resin Technology, 1979, 8(9), 8-9.

329. BAJI, A.P.: Epoxy coatings: today and tomorrow. Journal of the Colour Society, 1979, 18(3), 13-18.

Reviews the state of art in the field of epoxy coatings today and the newer technologies on our threshold. (AA)

330. BATRA, K & CHANDRA, S.: Polyesters in surface coatings. Popular Plastics & Rubber, 1979, 24(7), 19-21.

Gives the raw materials required to manufacture polyesters, and discusses the types and uses of polyester coatings. (KSDR)

331. KASBEKAR, S.R.: Paints & varnishes industry, 1978-79. Chemical Weekly, 1980, Annual number, 221-222.

An overview of the paints & varnishes industries is given. Combined income, expenditure and appropriation account of nine paints & varnishes companies and other financial data have been given. (MSR)

RUBBER

332. -----: Rubber industry in India - A survey. The Chemical and Polymer Times, 1980, 9(7), 5.

333. -----: Rubber moulded goods. The Chemical and Polymer Times, 1980, 9(7), 8.

Gives a profile on rubber moulded goods indicating the fixed capital on plant and machinery as Rs 9.40 lakhs.

334. -----: Rubber and rubber products: scope for new capacity in the eighties. Industrial Researcher, 1981, 7(4), 283-288.

Discusses the consumption of rubber, the present pattern of production of rubber products such as footwear, tyres, tubes, conveyor belts, fan belts and V-belts, hoses and their demand in the eighties. Assesses the overall demand for rubber and the likely competition from plastics. (JBS)

335. -----: World rubber consumption forecast 1980-81. Rubber India, 1980, 32(7), 25-26.

The world wide consumption of synthetic and natural rubber in 1979, 1980, 1985 and 1990 and the forecast of new rubber consumption by region are given.

336. NAIR, S.V.: Natural rubber: Consumption overtaking production. Rubber & Plastics Digest, 1980, 15(1), 17-19.

Gives the statistics on production, consumption, imports and exports of natural rubber since 1968. (KSDR)

## LEATHER INDUSTRY

337. -----: Executive instruction for compulsory quality and pre-shipment inspection of footwear and footwear components by the export inspection agency. Lexport Bulletin, 1981, 3(6), 1-27.

338. -----: Leather industry - prospects for future development. Industrial Researcher, 1981, 7(4), 245-249.

Around 80 per cent of the units engaged in the leather industry in India are in the cottage sector and their contribution to total leather exports is around 40 per cent. The major end uses of leather are in footwear and leather garment industries. Production, consumption, export and scope for new capacities for leather and leather products are shown. (JBS)

339. BALASUBRAMANYAM, K.R.: Custom formalities - A bird's eye view. A guide to finished leather exporters. Lexport Bulletin, 1981, 3(6), 44-54.

340. BHAT, A.H et al: Manufacture of garment leathers from E.I. Wool sheepskins. Substitution of chrome by basic aluminium sulphate. Leather Markets, 1980, 10(5), 20-22.

The details of the process study are given.

341. KHAN, A.A.: Availability of and scope of vegetable tannins in Pakistan. Indian Leather, 1980, 14(8), 45-49.

342. MARTINELLI, B & STREICHER, G.: Dyeing of dry leather in finishing with irgaderm liquid dyes. Leather Processing, 1980, 4(4), 14-20.

Reviews the dyeing methods in general and gives the process of dyeing with irgaderm liquid dyes.

## MECHANICAL ENGINEERING

343. -----: Fresh avenues for scope in the ball and roller bearing industry. Industrial Researcher, 1981, 7(4), 273-277.

About a thousand varieties of bearings are required for the engineering industries, but India manufactures only 600 varieties, and the remaining are imported. The production in 1979 by 10 units was 30 million numbers and 6 million numbers were imported. The demand for bearings in 1985 is estimated at 61 million numbers whereas the likely installed capacity by 1985 will be around 60 million numbers per annum. A review is made of the present state of the industry, the present demand and future projections and the overall scope in the eighties. (JBS)

344. -----: Prospects for development of cold storages in India. Industrial Researcher, 1981, 8(1), 41-44.

Focuses on the present situation of cold storage industry, the estimated demand, and discusses the problems faced by the industry.

345. BEWICK, T.: Recent developments in gravity diecasting. Foundry Trade Journal, 1979, 147(3178), 19-32.

Discusses briefly some of the developments currently taking place in the gravity-diecasting foundry industry, including the wide availability of mechanised diecasting machines and automated pouring devices. Also mentioned in the survey is thermal control of dies, and the need for closer metallurgical control on the shop floor. Concludes with the warning that unless UK gravity diecasters adapt to the needs of the 1980s then they may suffer reduced orders, due to increased overseas competetion.

## MINERAL BASED INDUSTRIES

346. -----: Raw materials for cement manufacture - present status, problems and advancements. Chemical Age of India, 1980, 31(8), 831-836.

The location of a cement plant is primarily controlled by the occurrence of limestone deposits. A thorough assessment of raw materials (mainly limestone) including the types of deposits, quality and its variation is of prime importance. Towards this end, the raw material assessment should incorporate the quantity available, commensurate with the plant capacity, quantum of work involved in prospecting for achieving the desired quantity as well as quality and various other important physico-chemical and technological parameters. The common present day problems in raw material winning are high overburden stripping ratio, quality variation, quarries and mining problems. These problems can be effectively tackled through systematic and rationalised planning and prospecting at each stage. Significant advances have taken place in recent years in raw material assessment and exploitation viz., geometrisation of the deposit characteristics during evaluation, implementation of Network analysis technique in exploration and exploitation etc. In raw material exploitation, use of mobile crushing plants, preblending and homogenisation following mathematical models are being increasingly introduced.

347. CHOPRA, S.K.: Technological development and latest trends in cement manufacture. Chemical Age of India, 1980, 31(8), 885-891.

Modern trends and recent developments in the field of cement manufacture have been highlighted. Innovations, modifications and improvements in the various unit operations, machinery design, equipments and general installations have been discussed in brief. More recent developments in the pyroprocessing of raw materials like the fluidised bed, Reba process, cold-process, alinite process have been presented. Special reference has been made to the development in the field of precalcinator technology. Instrumental and quality control in cement industry has been discussed briefly.

348. HAJELA, R.B & GUPTA, R.G.: Bricks from acidic soils of Manipur valley. Indian Ceramics, 1980, 23(1), 5-8.

The acidic red loam of Manipur valley contain muscovite, illite, kaolinite, goethite, chert (polycrystalline quartz), soda potash feldspar and chlorite clay minerals. The bricks manufactured from these soils turn porous, yield poor strength and crack on burning at temperatures of 300-400°C, which has been attributed to clogging of pores in brick body due to the presence of 16-36% colloidal fines and rapid evolution of gases during oxidation of organic carbon, pyrite, ferruginuous materials etc., present in the soil.

The bursting of bricks during firing can be checked by the addition of opening material as grog or local sand (10-30%) by weight and firing at a controlled rate not exceeding 50°C/hour. Bricks of strength 70-250 kg/cm$^2$, water absorption 3 to 12% and bulk density 1.60 to 2.18 g/cc can be manufactured in the firing range of 1000 to 1050°C.

349. POLYCARP, J.: Cement industry: A challenge to engineers and planners. Chemical Age of India, 1980, 31(8) 809-813.

The task before the Indian cement industry, the incentives offered by Government, the current obstacles to production and some of the more important technical and general aspects are briefly treated in this outline of the industry.

350. SUBRAMANYAM, N.: Indian cement industry - An overview. Chemical Age of India, 1980, 31(8), 815-821.

Present status of the cement industry in India is reviewed. Future demand for cement, approved capacity, likely additions to the installed capacity and current technological trends in the cement production in the country are discussed.

351. UNWALLA, B.T.: Concrete technology: The state of the art. Chemical Age of India, 1980, 31(8), 837-845.

Reviews briefly the current thinking on concrete technology as it relates to specifications, compressive strength, material methods of test for hardened concrete and durability. Some recent advances in technology are also briefly indicated. (BS)

## ELECTRONICS INDUSTRIES

352. ALBENNET, T.: Electrolytic capacitors. Tantalum versus aluminium. Electronic Products Magazine, 1980, 23(3), 33-35.

The increasing scarcity and cost of tantalum have inspired a new generation of improved aluminium electrolytic capacitors. Gives the comparative table of tantalum and aluminium electrolytic capacitors. (VVR)

353. BRIDGES, M.: Conductive plastic potentiometers. Electronic Products Magazine, 1980, 22(11), 49-51.

Explains the electrical parameters and performance of conductive plastic, cermet and moulded carbon potentiometers and also explains how conductive plastic potentiometers are superior and more suitable than either cement or moulded carbon poly for many industrial grade panel control applications. (VVR)

354. CUMMINGS, J.C.: Membrane switches. Electronic Products Magazine, 1980, 22(11), 53-56.

Explains the membrane switch which is an alternative to discrete push button switches and gives its advantages and disadvantages. (VVR)

355. DEMATOS, H.V.: Plastic film capacitors. Electronic Products Magazine, 1980, 23(3), 27.

Compares briefly the performance characteristics of each type of plastic film capacitors. Gives the characteristics of film dielectrics in tabular form. (VVR)

356. MILLER, R.W.: Considerations in the evaluation of plastics in electrical equipment. Plastics Design & Processing, 1980, 20(7), 25-30.

357. SHARMA, A.S.: India's television industry in the eighties. Electronics for you, 1980, 12(8), 47-51.

Presents the production growth of TV receivers, picture tubes and market position of TV sets from 1970 to 1980. (BSR)

358. UEDE, H.: Display devices - their trends of future prospects. Journal of Electronic Engineering, 1980, 17(165), 40-43.

Discusses the present state of display devices namely LEDS, LCDS, ECDS (Electro Chromic Displays) and ELD (Electroluminescent displays) and trends in their future development. (VVR)

# SENDOC Services

Featured in this section are technical enquiries that were received and the services rendered by SENDOC during the month of May, 1981. The charges for short technical enquiries will be ₨ 5/- to ₨ 10/- per typed page. Industry profiles already available with SENDOC are charged at the rate of ₨ 10/- each.

| S.No.<br>1 | Enquirer<br>2 | Service Rendered<br>3 |
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| 1. | Ent. - Andhra Pradesh | Profiles on: Safety matches, Electroplating, Rubber rollers for rice mills, Straw board, Absorbent cotton, Electric clocks, Gear cases, Bicycle chain, Bicycle spokes & nipples, Bicycle rims, Straw board, Automobile filter elements, Corrugated board & box making, Solvent extraction, Leather tanning, Polythene tubular films, GLS Lamps, Pendulum clocks, Polypropylene blown films, Tin containers, Ammonia paper, Kraft paper, and Gasket shellac compound. |
| 2. | Ent. - Bihar | Profiles on: Jute sacks, Biscuit. |
| 3. | Ent. - Karnataka | Profiles on: Citral from lemongrass oil, Wax candle, Calcium chloride, Micro-cellular soling, Egg powder, Fabrication unit. |
| 4. | Ent. - Madhya Pradesh | Profiles on: Bone meal, Wood seasoning, Bone crushing plant. |
| 5. | Ent. - Maharashtra | Profiles on: Jute sacks, Corrugated board & box making, Plastic industrial components, Polythelene bags, Stainless steel utensils, PVC cables, PVC footwear, Fountain pen, Waste cotton yarn, Hydrated lime, Guar gum. |

| 1 | 2 | 3 |
|---|---|---|
| 6. | Ent. - Orissa | Profiles on: Ammonia paper, Egg albumen flakes. |
| 7. | Ent. - Tamil Nadu | Profiles on: Flush door, Wooden bobbins. |
| 8. | Ent. - Uttar Pradesh | Profiles on: Straw board, Stone crushing machine. |
| 9. | Ent. - West Bengal | Profile on: Sodium silicate. |
| 10. | SI - Andhra Pradesh | Profiles on: Solder & flux, Industrial alcohol, Auto lamps, Automobile filter elements. |
| 11. | SI - Bihar | Profile on: Tyre retreading. |
| 12. | SI - Gujarat | Profiles on: Latex rubber threads, Industrial alcohol, Oxalic acid.<br>Technical note on mini cement plant. |
| 13. | SI - Karnataka | Profile on: Roller flour mill. |
| 14. | SI - Maharashtra | Profiles on: Wood seasoning, Aluminium furniture, Safety matches, Mango processing, Plastic moulding. |
| 15. | SI - Rajasthan | Profiles on: Bleaching powder, Flour mill. |

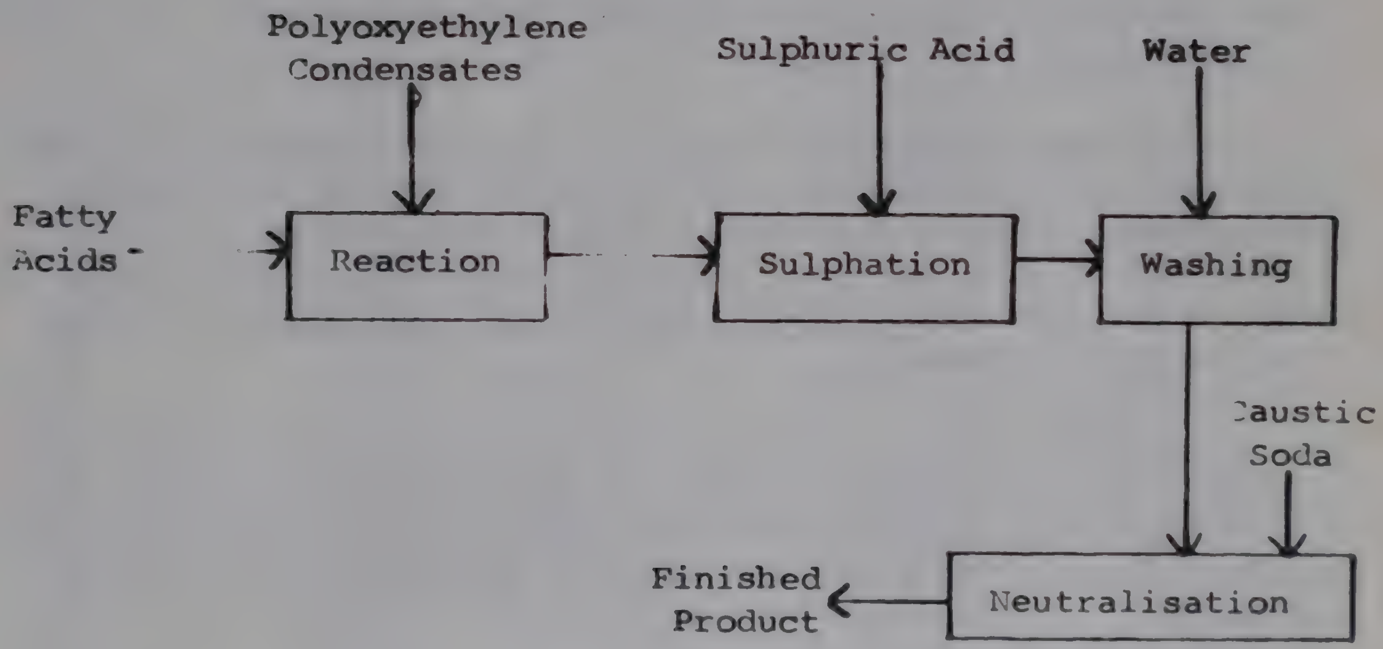
Ent. - Entrepreneur; SI - Small Industry

# New Products and Processes

## CHEMICAL INDUSTRIES

**Cenlesols**

BLOCK FLOW DIAGRAM FOR CENLESOLS


Polyoxyethylene Condensates
Sulphuric Acid
Water
Fatty Acids
Reaction
Sulphation
Washing
Caustic Soda
Finished Product
Neutralisation

Fat liquors are blends of emulsifying agents like sulphated oils and neutral oils (vegetable, animal, marine and mineral) and find extensive application in the processing of leathers. Almost all types of leather are either fat liquored or oiled after the tanning process. The nature of fat liquor to be used and its percentage depends on the type of leather to be manufactured. Different types of fat liquors are available like anionic, cationic and a combination of both. The anionic ones are the most commonly used for a variety of leathers.

Cenlesols are a series of newer anionic fat liquors which relate to improvements in the manufacture of fat liquors with neutral oils. These are designated as Cenlesol 1,2,12,30,40, 60, 74 and 360.

To begin with, a saturated solution of crude common salt is prepared. Then a slurry of technical grade lime in water is added to the solution, followed by solution of soda ash. The quantities of lime and soda ash added depend on the amount of impurities present in the crude salt. The treated solution is allowed to stand overnight and then filtered through a filter press to separate the precipitated impurities. The clear solution thus obtained is evaporated in jacketted open pan with constant agitation. The crystallisation of sodium chloride takes place in the pan. The crystals grown to the desired size and shape are centrifuged and dried in a rotary drier. For making the table salt free flowing, it is coated with small quantities of paraffin wax and basic magnesium carbonate.

The process developed by the Central Salt & Marine Chemicals Research Institute, Bhavnagar, has been investigated on a bench scale and successfully commercialised.

The main raw materials required in the process are common salt, lime, soda ash, hydrochloric acid, basic magnesium carbonate and paraffin wax. All these are available in the country.

The major items of plant and equipment include centrifuge, drier, jacketted vessels, sieve shaker and boiler. All these are available in the country.

It is estimated that a plant having a capacity to produce 300 tonnes of high grade salt per annum would need an investment of Rs 5 million, excluding land and buildings. The unit would need 10 persons for operation and maintenance.

## Wire Drawing Lubricant

Wire drawing operations are accompanied by considerable friction and generation of heat and therefore efficient lubrication is necessary to protect the dies against wear and to dissipate heat to prevent the welding of the wire to the dies. In fact dissipation of heat is very important in fine wire drawing operations. Extensive research and developmental work has been carried out for developing good quality wire drawing lubricants.

Defence Materials Stores Research and Development Establishment, Kanpur has developed a process for the production of the lubricant. The process is simple and involves only mixing of the ingredients at a suitable temperature, with stirring.

The process has been carried out on a pilot plant scale. The process being simple no scale up problems are expected.

Tallow oil, ground nut oil, castor oil, glycerine, softener and anti-foaming agent are the main raw materials needed for the process. All these are available in the country. Kettle with stirrer, mixer with heating arrangement are the essential items of equipment needed. All these are available indigenenously.

It is estimated that a plant having a capacity of 6 tonnes of lubricant per year would need an investment of Rs 0.1 million, excluding land and buildings. The plant has a potential for employing 4 persons.

## ELECTRONICS AND ELECTRICAL INDUSTRIES

### Controller for Reducing Power Consumption of Induction Motors

An electronic system that controls the current flow through an induction motor as its load varies so as to reduce the overall power consumption has been devised by Dr. P.J. Unsworth in the School of Mathematical and Physical Sciences at the University of Sussex. An override circuit is provided to deliver full supply current to motors starting up from rest and to prevent stalling by suddenly applied heavy loads. Several motors can be controlled in parallel by a single control system.

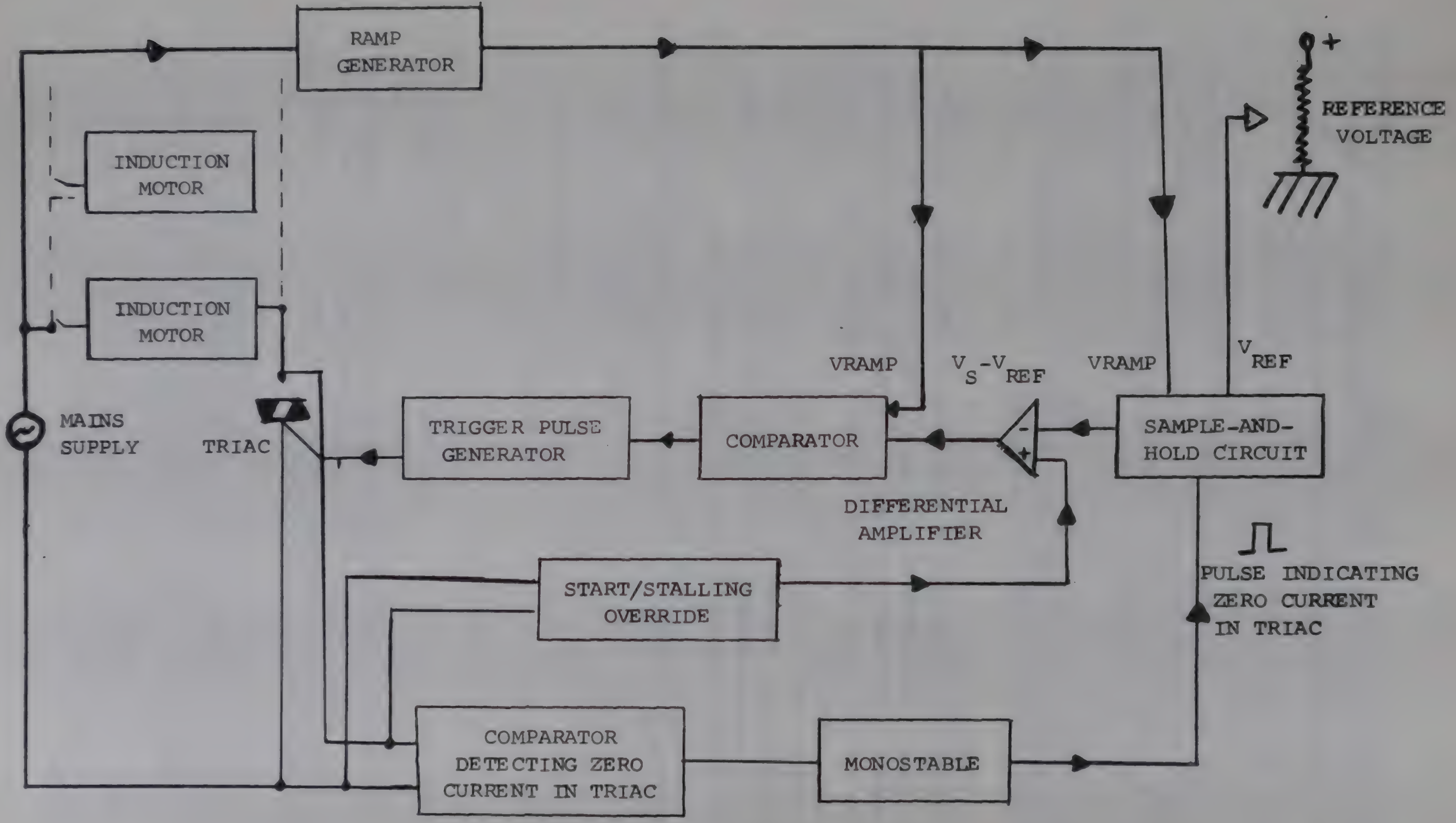
The power consumption of an induction motor is given by the equation $W = VI \cos \phi$, where V and I are the RMS supply voltage and current drawn, respectively, and $\phi$ is the phase angle by which the current lags behind the voltage. Induction motors are generally most efficient when operating at their maximum rated load, since the phase lag is then small and the power factor $\cos \phi$ close to unity. Under reduced loading efficiency is greatly decreased because the phase lag $\phi$ is increased and the power factor reduced, so that the current drawn and the resulting losses from resistive heating and hysteresis are not reduced in proportion to load power.

Dr. Unsworth's system uses triac phase control to reduce the fraction of the mains cycle over which the motor draws current when running under conditions of reduced loading. Timing is referred to a sawtooth ramp voltage with return edges which occur when the mains voltage sinewave crosses zero. Pulses to trigger the triac are generated when a comparator indicates that the ramp voltage exceeds a control voltage. This control voltage, and hence the timing of the triac trigger pulse, is determined by the phase lag Ø between the supply voltage crossing zero and the current reaching zero. Under reduced load $\theta$ tends to increase and is used to increase the delay in firing the triac. $\theta$ is measured by sampling the ramp voltage at the moment the current reaches zero ($V_s$).

A sharp rise occurs in the voltage across the triac when the current through it reaches zero, and is fed to a comparator and monostable to generate the sampling pulse. The amplified difference between the sampled ramp voltage and a reference voltage provides the control voltage to fire the triac. The overall effect is to stabilise the phase lag $\theta$ at a value determined by the reference voltage.

This basic circuit requires modification for starting either a single motor or one of several motors connected in parallel. If one motor is running normally at the predetermined phase angle and a second is then connected in parallel, the resulting net phase angle $\theta$ may be greater or less than that of the single motor, depending on the characteristics of the two motors. The unaided response of the basic circuit may not be sufficient to start the second motor reliably. An override system is therefore provided which monitors the voltage across the triac in its non-conducting period. This voltage is the mains voltage less the back EMF generated by the rotating motor, so if a stationary motor is connected (producing no back EMF), the peak voltage across the triac increases towards the full mains value (or is the full mains value). The voltage rise is detected by the override system and applied to the differential amplifier so as to cause the triac to fire without delay and deliver the full mains supply to the motor.

As the motor speeds up it begins to generate a greater back EMF, the net voltage across the triac when not conducting falls, the override circuit drops out of operation, and normal phase control is resumed. This circuit also senses any tendency of a motor to stall (eg from sudden heavy loading) and increases the power to the motor before this can happen.


RAMP GENERATOR
INDUCTION MOTOR
INDUCTION MOTOR
MAINS SUPPLY
TRIAC
TRIGGER PULSE GENERATOR
VRAMP
COMPARATOR
$V_S - V_{REF}$
VRAMP
$V_{REF}$
REFERENCE VOLTAGE
+
-
+
SAMPLE-AND-HOLD CIRCUIT
DIFFERENTIAL AMPLIFIER
PULSE INDICATING ZERO CURRENT IN TRIAC
START/STALLING OVERRIDE
COMPARATOR DETECTING ZERO CURRENT IN TRIAC
MONOSTABLE

SCHEMATIC OF CONTROLLER CIRCUITS FOR SINGLE-PHASE MOTOR

Up to eight motors can be run in parallel from the same control unit and, if they are operating with different phase lags, their back EMFs transfer eargy between one another so that each receives its power requirement. The control unit will select the best average timing for the entire motor system.u

The system may also be used to control three-phase motors. The current through each phase winding is controlled by a separate series triac and controller. To enable the three controllers all to operate at earth potential and use a single override circuit, the triacs are fired via isolating pulse transformers, and the voltages $V_t$ across the triacs, from which the control voltages are derived, are transmitted to the controllers via optical isolaters.

The main advantage of Dr. Unsworth's control system is that it effectively produces the same result as a reduction in power supply voltage when the motor requirement falls. Hence the power factor and efficiency of a motor remain high, irrespective of the motor loading. Motors controlled by the system have been observed to consume 5% to 50% less power, depending on loading, and to run correspondingly cooler, and often with less vibration. The circuit meets all transient demands to start motors and handle load variations, even when many motors are operated in parallel from a single controller.

Companies interested in manufacturing control systems for induction motors based on this work under NRDC licence are invited to contact Peter Thompson, Computers Systems and Electronics Group, NRDC, Kingsgate House, 66-74 Victoria Street, London, SW1 E 6SL, UK who can arrange for demonstrations of the experimental unit at the University.

Proton Precession Magnetometer

The device is used for the measurement of the total vector of the Earth's magnetic field at a place. The quantity thus measured can be interpreted in geological terms in prospecting for minerals and ground water and investigations for bed rock topography in dam site selections. This instrument is also used in archeomagnetic investigations.

The device consists of sensor, the magnetometer and the power source. The instrument measures the magnetic field by counting the free precession frequency of proton in earth's magnetic field by first subjecting the sample contained in the sensor to a strong magnetic field and then allowing the proton in the sample to precess in the ambient field after withdrawing the strong polarizing field. Accuracy of the instrument is one gamma.

The work has been carried out on a batch scale at the National Geophysical Research Institute, Hyderabad. So far three instruments have been made and tested and the performance of these instruments has been found satisfactory.

The main raw materials/components required are electronic hardware like, transistors, diodes, integrated circuits, capacitors, chokes, resistances etc. and materials like bakelite, glass epoxy copper clad boards etc. All these items are available indigenously.

No special plant and machinery is required for fabricating the unit. Bench drill, vice, grinder and some hand tools are enough to fabricate the unit.

The main test instruments required are digital multimeter, frequency counter, oscillator/function generator (upto one MHz) attenuator, oscilloscope, L.C.R. meter, battery charger, power supply and accumulators. All these items are available indigenously.

Manufacturing this item alone is not a viable venture. But if taken by a unit that is already established and geared to manufacture allied items, the manufacture of this item can become commercially viable as the investment on plant and machinery need not be duplicated. Cost of production per unit is Rs 15,000/- approximately.

## FOOD AND ALLIED INDUSTRIES

### Malted Beverage Food Based on Groundnut Flour

The malted beverage products available in the market are based on milk and some of them contain cocoa also. In India malted beverage foods based on vegetable proteins are not manufactured so far. By using vegetable proteins the industries need not depend upon milk which is scarce and on cocoa which is an imported commodity. The new product is based mainly on vegetable protein from groundnut flour, vegetable fat and synthetic chocolate flavour. The product is similar in nature and taste to other beverages such as Bournvita.

Groundnut flour is peptized at optimum pH and centrifuged. The pH of protein liquor is adjusted to neutral. Barley malt and wheat flour are mashed and the liquor obtained is blended with the peptized liquor from groundnut flour. The blended liquor is concentrated in an evaporator. Other ingredients like fat, sugar, flavour, colour, caramel, minerals, and vitamins are added to the concentrate. The resulting mixture is whipped in a mixer, spread on trays and dried in a vacuum shelf drier. The material reconstitutes easily in hot water or milk and possesses fine malt and chocolate flavour. The protein and fat content of the product are 18% and 7% respectively.

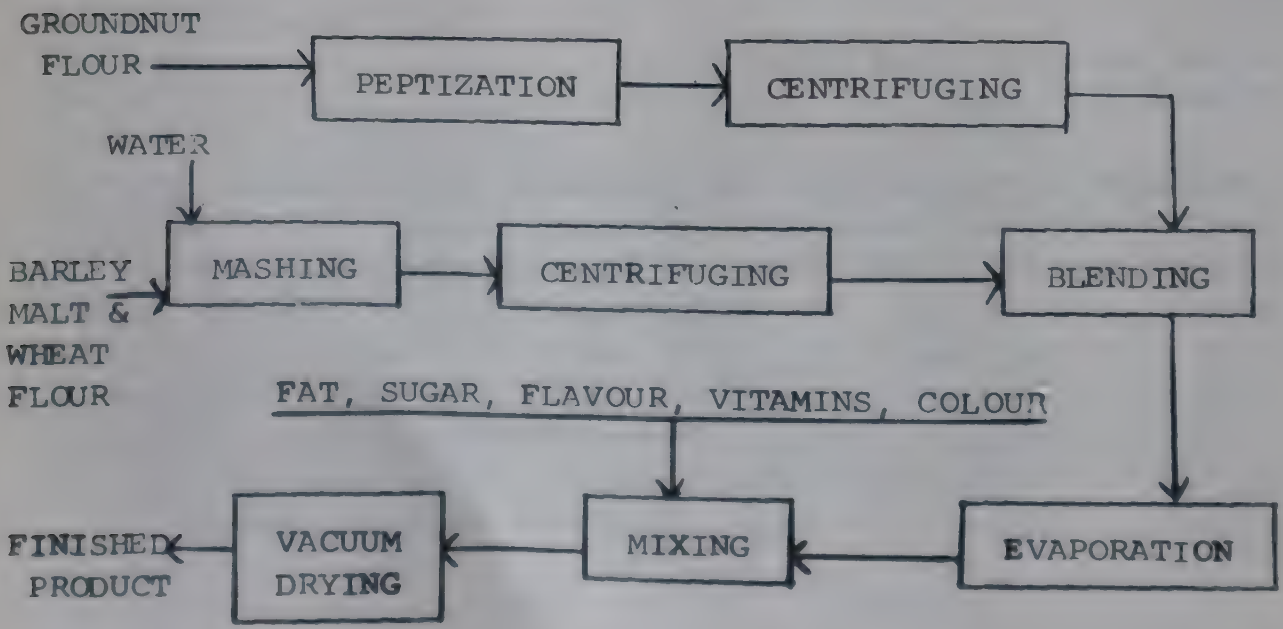
The work has been carried out on a scale of 2 kg per batch at the Central Food Technological Research Institute, Mysore.

The main raw materials required in the process are sugar, barley, wheat flour, agar, sodium alginate, CMC and cocoa. All except cocoa are indigenously available.

The equipment required are steam kettles, holding vessels, sanitary pumps, centrifuges, vacuum evaporator, vacuum shelf drier, boiler, etc. All the items are indigenously available.

The investment required for a plant producing 300 kg/day of food is estimated at Rs 50 lakhs excluding the cost of land and building. About 10 persons are required for running the plant. The process has been licensed to three parties.

BLOCK FLOW DIAGRAM FOR MALTED BEVERAGE FOOD


GROUNDNUT FLOUR
PEPTIZATION
CENTRIFUGING
WATER
BARLEY MALT & WHEAT FLOUR
MASHING
CENTRIFUGING
BLENDING
FAT, SUGAR, FLAVOUR, VITAMINS, COLOUR
FINISHED PRODUCT
VACUUM DRYING
MIXING
EVAPORATION

## Mechanized Canned Gata Production

Coconut cream (gata) is the white extract of ground coconut meat and is rich in vegetable fat. It is very popular in tropical countries. The National Institute of Science and Technology (NIST), Philippines, has developed a mechanized process to produce canned gata which has a shelf-life of more than one year. The main feature of the mechanization process is the continuous extraction of coconut cream using a screw-type expeller.

Gata in cans eliminates the tedious preparation of coconut cream, usually done in the household through manual extraction. In the new process, mature and sound de-husked coconuts are selected and cracked; they are then de-shelled to separate the meat from the shell. The coconut meat is washed, weighed and fed to thegrinding machine.

The ground meat is then mixed with one half to twice its weight in water and passed through an expeller or a screw press to extract the coconut cream. The cream is separated from the resulting slurry extract by centrifuge, and is mixed again with one half to twice its weight in water and pasteurized for 15 to 30 minutes. The pasteurized cream is mixed thoroughly with a stabilizer and passed through a homogenizer for further blending. The homogenized mixture is then heated almost to the boiling point, poured into tin cans, sealed immediately and sterilized at a pressure of 6-10 psi (0.4-0.7 bar) for 45 to 70 minutes. The pilot plant currently produces gata in cans at the rate of 1,000 12-oz (0.3 -1) cans per 8-hour shift. Cans of sweetened and unsweetened gata are also produced in 10-oz (0.3-1) and 1-gallon (3.8-1) sizes. It is also possible to produce other useful by-products from coconut by this operation, such as vinegar and nata de coco from the coconut water, oil from sapal and animal feed from coconut meal and cake.

The process is patented under Philippines patent No. 5632.

For further information contact: Dr. Vedasto R. Jose, Commissioner, National Institute of Science and Technology (NIST), P.O. Box. 774, Pedro Gil, Taft Avenue, Manila, Philippines.

MINERAL BASED INDUSTRIES

## Glass Lining of Chemical Process Equipment

Chemical process industry generally needs equipment resistant to one or the other form of corrosion. Many different alloys have been used for the purpose. There are still some chemicals for which no metals are suitable. This problem is solved, to some extent, by glass lining of the process equipment. Glass lining involves use of frits of standard composition applied at standardised conditions on a metal surface.

Regional Research Laboratory, Hyderabad has developed a composition for a frit, standardised the conditions for glass lining and has also described the specifications of the steel suitable for glass lining.

Ingredients consisting of minerals and chemicals are mixed in the desired proportion and melted in sillimanite crucibles in an electric or oil fired furnace. The molten mass is quenched by pouring in cold water. The frit, thus obtained is dried and ground in a pot mill. The ground frit is mixed with water and made into a slip suitable for spraying on a surface to be coated.

The iron or steel surface of the equipment to be lined is annealed in a furnace and pickled in acid to remove any oily or greasy material sticking to the surface. The surface is then washed, given a chemical treatment and cleaned with the glass slip and dried. The equipment is then heated in a furnace when the glass slip fuses and sticks to the surface. It is then dried and enamelled. This operation is repeated when higher thickness of lining are required.

Vessels of 250 litres capacity were successfully glass lined at the laboratory.

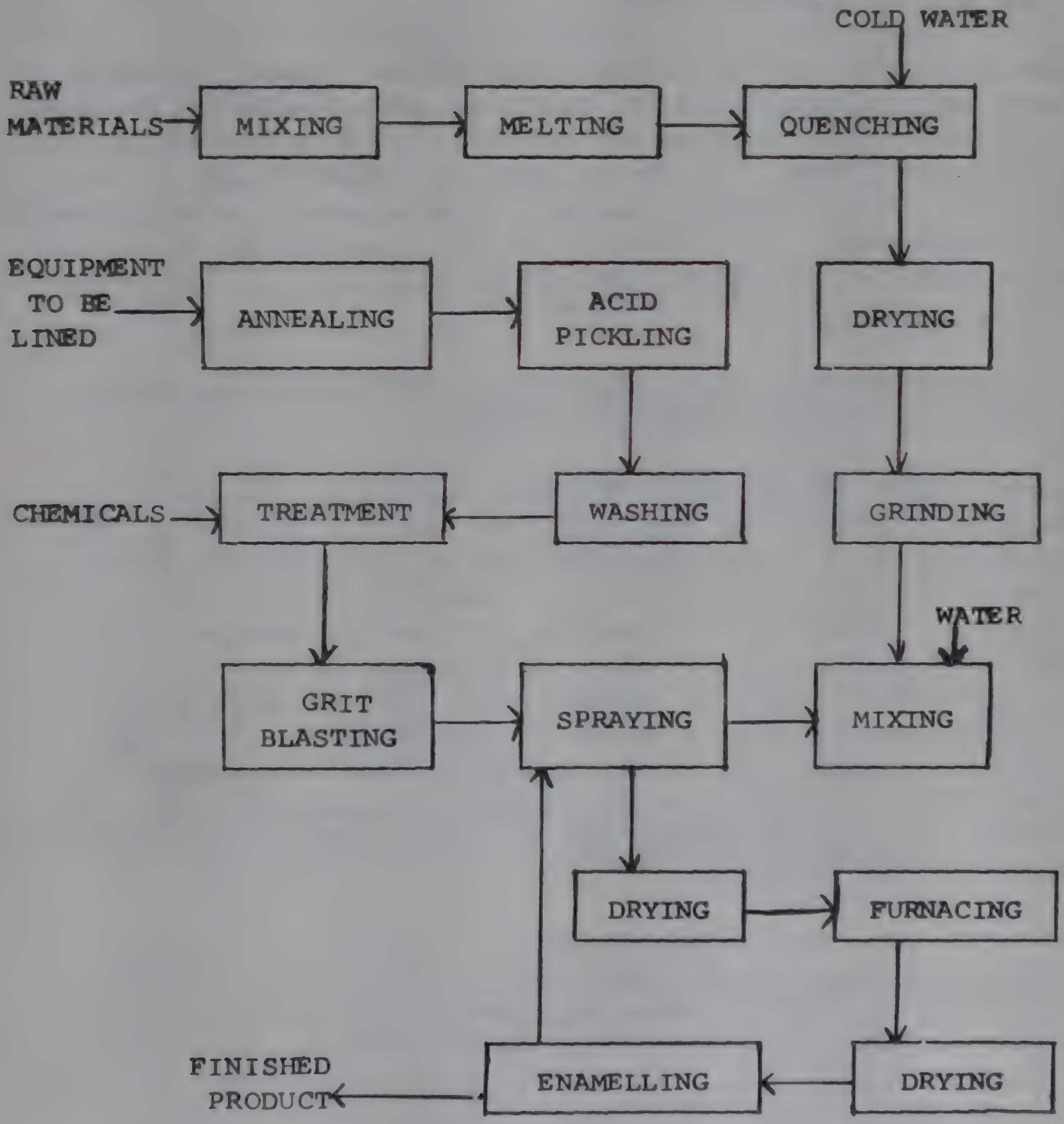
The main raw materials required are: quartz, sand, felspar, aluminium hydroxide, borax, carbonates of calcium, barium & sodium, and magnesium oxide. All these are indigenously available.

The main items of equipment required are oil fired muffle furnace for glass lining, oil burners, pre-heaters, compressor blowers and tanks. Other equipment required are pots, spray guns and trays. All these are available indigenously.

It has been estimated that a plant having a capacity to glass line 100 vessels of 250 litres capacity per year would need an investment of Rs 2.7 million, excluding land and buildings.

The plant of the above capacity has a potential to employ 55 persons for operation, supervision, and maintenance.

BLOCK FLOW DIAGRAM FOR GLASS LINING PROCESS


COLD WATER
RAW MATERIALS
MIXING
MELTING
QUENCHING
EQUIPMENT TO BE LINED
ANNEALING
ACID PICKLING
DRYING
CHEMICALS
TREATMENT
WASHING
GRINDING
WATER
GRIT BLASTING
SPRAYING
MIXING
DRYING
FURNACING
FINISHED PRODUCT
ENAMELLING
DRYING

## Silicon Nitride

Silicon nitride is a synthetic non-oxide refractory material for special applications. The silicon nitride ceramic has got outstanding thermal shock resistance, high strength at high temperature (strength increases with temperature instead of falling as with ordinary ceramics), and extreme resistance to corrosion of all non-ferrous metals. It has a coefficient of friction of about 0.4 at room temperature that falls down to 0.2 at high temperatures.

Silicon nitride can be manufactured in two forms - reaction bonded and hot pressed. The reaction bonded material is used for thermo-couple sheaths and furnace crucible linings in non-ferrous metallurgy. It can be used for ceramic seals in water pumps, for argon welding nozzles and as support in metal toughening industries. It is resistant to corrosion by fluorides and chlorine up to 1000°C and can be used as evaporation boat in metal coating.

It is expected that when indigenously available this material may have a demand of about 10 tonnes/yr.

Central Glass and Ceramics Research Institute, Calcutta has developed a method for manufacturing reaction bonded silicon nitride having a transverse strength of 5000-15000 psi and porosity 15-30%. The process is completed in the following steps: (i) powdering of elemental silicon to required grain size; (ii) preparation of slip or semi-dry mixture with suitable additive, catalyst, binder, etc; (iii) preparation of hollow or solid shapes by slip casting/pressing/extrusion; (iv) prenitriding in a nitriding kiln in nitrogen/ammonia at 1320-1400°C; (v) machining of shapes to close tolerance, if needed; (vi) full nitriding (as in iv) at 1320-1450°C; (vii) inspection and packing.

The major items of equipment required for manufacturing the product are jaw crusher, disc crusher, vibratory ball mill, 50-tonne press for dry pressing, horizontal and vertical extrusion machine, nitriding kiln, lathe machine, and clipper machine.

The total capital investment required for a suggested optimum capacity plant producing 5 tonnes/yr of the product is estimated at Rs 8.27 lakhs (land, building and shed Rs 2 lakhs; plant and machinery Rs 5.67 lakhs; working capital for 3 months Rs 0.6 lakh).

# SURFACE COATINGS

## Emulsion Paints

An emulsion paint contains a considerable quantity of oleoresinous alkyd or other oil-phase material emulsified with an aqueous phase. These paints are readily diluted or thinned with water. These are quick drying and free from objectionable odours and fire hazard. An emulsion paint is more complex than a straight oleoresin paint. It may contain pigment and extenders, oils and resinous materials, rubber like materials, emulsifying agents, stabilizers, preservatives, antifoaming agent and driers. In some formulations a certain amount of non-drying volatile oil may also be used. These are generally used as decorative paints.

Steps involved in the process are:

a) Drying oil is styrenated in a suitable reaction vessel. After the styrenation is complete, the product is cooled.

b) Styrenated drying oil after suitable dilution is mixed with emulsifier and drier to obtain oil phase. The water phase is similarly prepared by mixing an emulsifier, stabiliser and antifoaming agent in suitable amount of water. Water and oil phases are emulsified by stirring together at high speed.

c) Pigment paste is prepared by grinding the pigment with suitable extenders, dispersing agents and water in a mill.

d) Suitable amount of emulsion and pigment paste are taken and mixed together to get paint of required consistency.

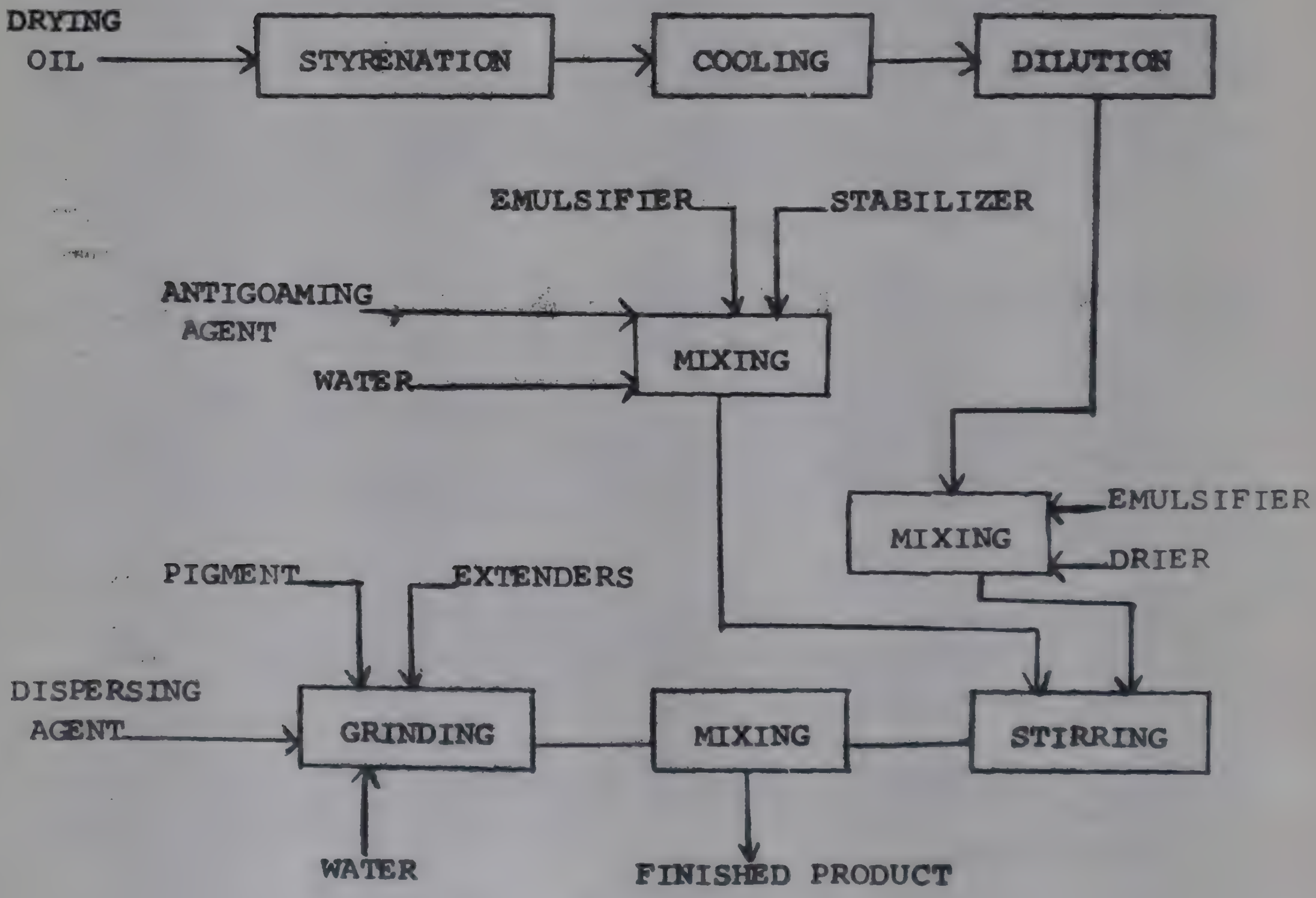
The process has been studied on a scale of 20 kg. per batch at the Regional Research Laboratory, Hyderabad.

Dehydrated castor oil, styrene, solvents, emulsifiers, stabiliser, borax, liquor ammonia, pine oil, titanium dioxide, china clay, bentonite, sodium pyrophosphate, thickeners and dispersing agents are the main raw materials needed for the process. All these are available indigenously.

The main items of equipment required are styrenation-kettle, mixer, emulsifier and grinding mill. All these are available indigenously.

Investment required for a capacity of 500 kg. of emulsion paint per shift is estimated at ₨ 0.5 million, excluding land and buildings. The plant can provide employment for about 5 persons.

BLOCK FLOW DIAGRAM FOR EMULSION PAINTS


DRYING OIL
STYRENATION
COOLING
DILUTION
EMULSIFIER
STABILIZER
ANTIGOAMING AGENT
WATER
MIXING
MIXING
EMULSIFIER
DRIER
PIGMENT
EXTENDERS
DISPERSING AGENT
GRINDING
MIXING
STIRRING
WATER
FINISHED PRODUCT

Lacquer emulsions and glazing lacquers among others are some of the adjuncts that are useful in upgrading the poorer selection of leathers into "anilines" and "semi-anilines."

Glazing lacquers and lacquer emulsions are primarily used for improving the water resistance of the finished film of leather However a judicial application can produce an aniline look on leathers. Lacquer emulsions provide most aesthetic look by enhancing reflectance. These do not interfere with the natura feel and warmth of the leather.

Glazing lacquers are particularly useful in improving the appearance of plastic finished leather. The glazed products are able to show off thin material grain to better advantages, and possess a more kindly feel also. Glazing lacquers are also used in making hand boarded morocco leather, a speciality item that has a global market.

The grade of nitrocellulose, soluble in esters, ketones and alcohol-ether mixtures, is mixed with plasticizers, ground pigments and dyes in suitable solvents such as butanol, butyl acetate and dried. Pigment may be ground in ball mill. Some esters may have to be prepared for captive consumption.

The process has been successfully carried out on a laboratory scale at the Central Leather Research Institute, Madras.

The raw materials required are cellulose nitrate, castor oil, ester type plasticizers, alcohol soluble dyes, pigments, solvents, diluents etc. For the emulsion, some of the less volatile solvents, particularly ketones and emulsion stabilizers such as cellulose ethers are important. All these raw materials are available indigenously.

The main items of equipment are mixers, stirrers, ball mill, grinding unit and reaction kettle. All these are available indigenously.

The suggested economic capacity of the plant is 100 kg/day (single shift) and the investment shall be around Rs 0.12 million. The plant can provide employment for about 8 persons.

# New Machinery and Equipment

## ELECTRONICS AND ELECTRICAL EQUIPMENT

### Digital Low Resistance Ohmmeter

Evershed & Vignoles Ltd., have introduced the first digital electronic instrument in the Megger range: the D201 Ducter digital ohmmeter. This instrument employs today's digital technology.

The D201 is a portable, battery-operated test set with five measuring ranges covering 1 microohm to 20 ohms. Range selection is achieved by a single rotary control on the front panel. The test current is up to 10A d.c. depending on the range in use. The instrument is ideal for measuring earth bonding and continuity, as well as switch and circuit breaker contact resistance. It may be used for measurements of fuses, lightning conductors, transformer windings, armatures, bus-bar joints, welded connections and railbonds.

The instrument uses a four terminal measuring system, the sample under the test being connected by four wing-nut terminals. Special Duplex hand-spikes are provided; these are forced down on to the test item.

The measured value is presented direct on a $3\frac{1}{2}$ digit light emitting diode display. The characters are large and easy to read, being 12 mm high, and there is an automatic indication of the decimal point and minus sign.

Power to operate the test set comes from internal re-chargeable batteries. A separate battery charger unit is supplied; this operates from a power supply of 240V, 50/60Hz.

Two battery test positions ensure that a check can be made at any time on the battery powering the digital meter and also on the batteries that supply the measuring circuit.

The D201 is contained in a robust ABS plastic case with a carrying handle and a detachable lid, which also acts as a light shield for the digital display under bright sunlight conditions. The lid also carries the instruction book. The charger unit is supplied in a similar case and there is space provided for the storage of test leads.

The D201 is available against actual users' import licence. Further information can be had from: Jost's Engineering Company Limited, Great Social Building, Sir Phirozeshah Mehta Road, Bombay.

## Liquid-Crystal Display with Clip Connectors

Siemens is introducing a liquid-crystal display with edge clip connectors, which provide both the electrical and the mechanical connection to the PC board. The clip connectors are not permanently fixed to the glass plates and can be replaced if the need arises, should one of the pins become bent. Standard designs with permanently soldered pins do not offer this simple method of repair.

On the two long sides of the display, the 20-pin clip connectors are pushed onto an equal number of flat electrodes. The pins at right angles to the display have 1/10" centres. The display can also be mounted-on and, if required, soldered to a PC board just like a dual-in-line device.

The four-digit liquid-crystal display with 18 mm-high symbols is suitable for medium size clocks and for equipment and installations where a display also has to be legible at a distance. This display type is also available with $3^{1/2}$ digits with commas between the individual symbols.

Further information from: Siemens AG, Zentralstelle for information, Postfach 103, D-8000 Munchen 1, Federal Republic of Germany.

## Power and Printing System

Aptek Electronics Pvt. Ltd., has developed a new power system as well as a printing system.

Power system with output upto 5KWA and with all solid state design, consists of an automatic voltage regulator, float boost charge, inverters and static transfer switch. The load transfer is manual, automatic with relays or automatic with static transfer switch. It also provides short circuits and overload protection.

It is used in railway signalling systems, microwave communication, medical and other emergency systems. It is available in floor-mounted models. Universal Printer accepts - 4 digits multiplexed, true BCD, Open collector data and prints data in black, -ve data in red colour. Printing is at the rate of 1 line per second maximum with remote printing facility also. Decimal point selection is possible. It also issues 'hold' command for freezing data during printing. Paper feed facility, 3 digits batch printing along with data print, 12 digits floating point averaging and totalizing facilities are also provided. It is a mains-operated machine, available with or without digital control monitoring systems.

For details contact: Aptex Electronics Pvt. Ltd., 505 "Trimurti" Senapati Bapat Marg, Near Kohinoor Tech. Institute, Dadar (West), Bombay-28.

## Variable-Frequency Inverters

A range of variable frequency inverter drives enables ac three-phase motors to be used in variable-speed applications at a cost comparable with dc thyristor drive systems in the smaller power ranges. This permits full advantages to be taken of the technical superiority of ac motors which are smaller in size for a given rating, has better performance characteristics, can withstand higher temperatures, and can be operated safely in flammable atmospheres. Small squirrel cage asynchronous ac motors are readily available throughout the world.

Intended for use in pump, machine tool, conveyor and any other applications where motor speed must be controlled, the drives are in two versions.

Both versions are stabilized to maintain motor speed within about 2 per cent regardless of variations in mains voltage within normal limits, and special features ensure motor stability over a wide range of supply frequencies. As the signal controlling the motor is isolated from the mains supply, the drives are suitable for computer or microprocessor-controlled applications as well as for manual speed setting.

The equipment is fully protected against motor faults and shortcircuit by fuses and overload protection devices.

Further information from: W Controls, Ashifield House, Enderby Road, Blaby, Leicester, England.

## ENGINEERING EQUIPMENT

### Paddy Husk Combustor-cum-Heat Exchanger

A combustor-cum-heat exchanger utilizing waste rice husk has been installed at the Modern Rice Mills of the Food Corporation of India (FCI) at Durgapur. The design and development of the unit was taken up jointly by the Central Mechanical Engineering Research Institute, Durgapur and the Central Fuel Research Institute, Dhanbad, under a scheme sponsored by the FCI and the Union Ministry of Agriculture and Irrigation.

Based on the design details worked out on a small scale at CMERI, the combustor-cum-heat exchanger has a capacity to deliver 6000 cu ft/min of hot air. The unit is mainly for drying paddy in rice mills directly by the hot air generated by burning paddy husk. It has a capacity to dry about 1.2 tonnes of parboiled paddy by burning about 100 kg of husk per hour. An appreciable quantity of furnace oil is thus saved, leading to considerable economy in fuel consumption and consequently conservation of foreign exchange. The new, drying technique eliminates the chances of sulphur contamination of rice, which invariably happens in furnace oil fired drying.

### Rotary Twin-Lobe Compressor

Rotary twin-lobe compressors, also popularly known as rotary blowers, are now available up to capacity of 10,000 $M^3$/hr of air and upto discharge pressure of 1 kg/$Cm^2$. The blowers are offered both in air cooled and water cooled type, depending on the delivery pressure. The blowers have a characteristic of delivering oil-free compressed air and hence suitable for many process applications in chemical industries where such air is required. The blowers have an air-tight construction and can be used for compression or exhausting of corrosive or inflammable gases.

Swam blowers are manufactured to high engineering standards and incorporate many superior features and are tested for performance to BS-1571.

Rotary blowers are used in sugar and cement plants, chemical and pharmaceutical industries, Ice water treatment and sewage treatment plants and many other applications.

Further details, can be had from M/s. Swam Pneumatics Pvt. Ltd., C-2, Sector-3, Noida Distt. Ghaziabad (U.P).

## Sand Dehydrator

A sand dehydrator is stated by its British manufacturer to be particularly suitable for incorporation in mobile rock screening and scrubbing plant.

Four models of the simple and rugged Cindaco Sandscrew are offered with outputs ranging from 45 tonnes/hr to 180 tonnes/hr. Basically, the equipment comprises an inclined trough, the lower end of which is enlarged to form a settling tank. A precision-made ribbon screw rotates slowly inside the trough to discharge the sediments above the liquid level in the settling tank. This level and the rate of liquid flow are controlled by adjustable double over flow weirs on each side of the tank.

Slurry from scrubbing and screening operations is fed to the machine through a side-mounted chute, passing round the spiral to minimise turbulence. Coarse materials and foreign bodies such as twigs are arrested at this point, while the finer sand flows into the settling tank. Here it sediments out and is raked up the incline by the screw, which simultaneously squeezes and scrubs it to remove water and slime. Discharge height can be varied to suit particular stockpiling or cleaning arrangements. Clay and excess fines float up and pass over the twin weirs.

The machine is designed to give a long trouble-free life; its specification includes a rugged tail bearing said to last 20 years in normal use, and the ribbon assembly has renewable shoes. Paddles can be mounted between screw flights it required.

Manufacturers: Frederick Parker Ltd., P.O. Box 146, Leicester, England.

## PACKAGING MACHINERY

### Ampoule Filling & Sealing Machine

The United Engineering Co. has introduced a high-speed three-stroke automatic ampoule filling and sealing machine. It can fill 1 ml to 5 ml capacity ampoules with 3 syringes of SS 316 quality with drip-proof arrangements. The ampoules are flushed with nitrogen or $CO_2$ gas before and after filling. The machine has a 3/4-HP motor and is operated by only one operator to produce 3,600 to 4,800 ampoules per hour. The ampoules are fed automatically from an SS feeding hopper and collected automatically in a collection hopper without human touch. All contact parts can be easily dismantled for sterilisation. Lower speed machines are also available.

For further information write to: The United Engineering Company, Ashok Villa, V.B. Road, Vile-Parle (West), Bombay-400056.

### Colour Printed PP/PE Bags

Multi-colour printed polythene and polypropylene bags are manufactured by Flexo Print of Calcutta. Pre-treatment of the film surface by electronic corona discharge for permanent ink adhesion has made possible multi-colour printing on polythene and polypropylene. The bags are recommended for packaging detergents, confectionery, hosiery and garments. Even liquid milk is now packed in tamper-proof printed poly pouches. Printed polypropylene bags are especially suitable for packing food articles. Handle affixed polythene printed carried bags, though a bit costlier, offer a better medium of advertisement.

For further information write to: Flexo Print, 23-A, Netaji Subhas Road, Room No. 9, 7th Floor, Calcutta-700001.

### Volumetric Paint-Filling Machine

Metadic Engineering Private Limited have developed an automatic paint-filling machine for liquid paint and stainers. It is equipped for feeding, volumetric filling and lid-pressin operations. The containers are manually placed on the turntable. The rotating 'turntable' feeds the containers automatically onto the linear conveyor. From here, the containers are carried to the filling station. The filling machine operates on the volumetric principle, thereby delivering exactly measured quantities of the paint/stainer to the container. The filling unit is equipped with a no-container-no-fill device to avoid unwanted filling when there are no containers at the filling station. After the filling, a worker has to manually keep the lids on the containers, while these are moving on the conveyor towards the lid-pressing station. At the lid-pressing station, the containers pass through the assembly of several rollers - under gradually increasing pressure, so that the lids are perfectly pressed on when the containers come out of the station. The containers can be diverted for further operations from here. The machine is suitable for containers from 50 ml to 1,000 ml, with appropriate adjustments for various container sizes. The total output depends on the packing size and the number of filling heads. The machine is recommended for large production requirements.

For further information write to: Bakubhai Ambalal Kaiser-I Hind Building, Ballard Estate, Bombay-400038.

# Industry Roundup

This section highlights policies and proceduces, guidelines, the present status and future prospects in certain industries as well as the latest available data in respect of such industries.

## DISPLAY DEVICES

### INTRODUCTION

The optoelectronics industry came into existence in 1955. During the past twenty five years, optoelectronics has made a steady progress as a result of research and development efforts aimed to realise the practical applications of photo semiconductors. For example LEDs are now being used extensively in digital display devices. All the devices in the optoelectronic field have shown remarkable development particularly during the last decade. Optoelectronic components are used today in most branches of industry, such as, power engineering, data processing, machine control, heat engineering, automobile industry, space system, sound and video recording, photography, consumer electronics, medicine, etc. The display devices play an important role in electronics in forming the communication link with the human element. As data processing and other information based industries develop and adopt visual methods in addition to aural techniques, display devices will assume greater significance.

The term display devices applies to devices used in making displays whether through letters, numbers, or diagrams. At present a variety of display devices are available, each having its own special characteristics. No single display device combines all the features desired by the end user. One can choose any one of these displays depending upon the type of application keeping in view, its cost, brightness, life, compatibility with the supply voltage and suitability of environment.

Some important display devices are:

1. Light emitting diode (LED) displays
2. Liquid crystal displays (LCD)
3. Plasma gas discharge displays (PGD)
4. Vacuum fluorescent displays (VFD)
5. Incandescent lamp displays (ILD)
6. Electrochromic displays (ECD)
7. Electroluminescent displays (ELD)
8. Electrochemical (EMD) & Electrophoretic displays (EPID)

Display devices are future oriented products. LED indicator lamps, LED display devices and Liquid Crystal displays are now in rapid growth throughout the world.

## Different types of display devices

During the last few years, display technology has made rapid progress and as a result, a variety of displays are available today. These displays may be classified by several schemes, which are by segmental or dot matrix, by number and size of characters, and by emissive or passive mechanism. The principal types of displays presently available include light emitting diode display, gas discharge display, vacuum fluorescent display, incandescent display and liquid crystal display. Electrochromic display and electroluminescent displays are also becoming popular.

## Application of Display Devices

Display devices are finding wide usage in a broad range of applications which includes monitoring, control and measure= ment, optical coupling, source data reading for data processing, illumination and indicators, digital and analogue display of information, communication and film annotation.

## SOME TYPICAL DISPLAYS AND THEIR EFFECT/ PROCESS FOR DISPLAY

| Sl. No. | Display | Effect/ process | Fonts | Mechanism |
|---|---|---|---|---|
| 1. | Light emitting diode display<br>i. Red Ga AsP<br>ii. Red super bright Orange and Yellow | Electroluminescence | - Single and multidigit 7 segment Alpha numeric Single digit 7 segment, Alphanumeric | Monolithic or individual diode arrays Individual diodes and light pipes Industrial 35 diode arrays |
| 2. | Gas discharge<br>i. Dot. Matrix<br>ii. Planar flat flat panel<br>iii. Raised cathode | Plasma decay | Alphanumeric 5 x 200<br>- Multiple segment plus<br>- decimal and symbol<br>- Signal 7 segment and decimal 1/2 digit | DC Plasma<br>AC Plasma<br>DC Plasma<br>DC Plasma |
| 3. | Vacuum fluorescent | Cathodeluminescence | - Multi digit 7 segment and decimal 5 x 7, 20 character 14 segment multicharacter | - Hot filament in vacuum tube with phosphor-coated segment |
| 4. | Incandescent | - Black body radiation | - Individual 7 segment and decimal | - Hot filament in vacuum tube with phosphor-coated segments |
| 5. | Liquid crystal | Electro-polarisation | 7 segment | Nematic or field effect |
| 6. | Electrochromic | Dye or pigment (Electroluminescence.) | - | - |
| 7. | Electroluminescent | Electroluminescence | - | - |
| 8. | CRT | Cathode luminescence | Character generations | Electron gun in vaccum with phosphor screen. |

| LCD | Application |
|---|---|
| (a) Presently mass produced | 1. Calculators, watches, clocks, and consumer electronic appliances<br>2. Digital measuring instruments, data input terminals.<br>3. Home electrical appliances<br>4. Telephone sets<br>5. Automobile radios |
| (b) Fluorescent display tube | |
| 1. Segment types 2-17 digits | - Portable calculators, desk top calculators, clocks, etc. |
| 2. Alphanumeric types 8-32 characters | - Educational devices, OK monitors, telephone communications device |
| 3. Dot characters tubes 8-240 charaters | - Word processors, intelligent terminals, POS terminals |
| 4. Bargraph types | - Analogue industrial meters, level meters, speedometers, clinical instruments, etc. |
| 5. X-Y dot matrix tubes | - Image displays, graph displays, various data display devices. |
| 6. Multicolour tubes | - Level meters, Microwave ovens, Carmounted meters etc. |

## Research and Development

The research and development activity in the area of display devices and associated materials technology have been initiated in India and is being carried out at various laboratories, technological institutes, and production units.

## Organisations working in the field of display devices in India

| | Name of the Organisation | Area of Work |
|---|---|---|
| 1. | National Physical Laboratory, New Delhi. | - Liquid crystal displays, DC gas discharge displays. Lasers, solar cells. |
| 2. | Central Electronics and Engineering Research Institute, Pilani. | - Solar cell panels |
| 3. | Solid State Physics Laboratory, Delhi. | - Laser diode and photo diodes |
| 4. | Raman Research Institute, Bangalore. | - Liquid Crystal materials |
| 5. | Defence Research and Development Laboratory, Hyderabad. | - Optoelectronics devices |
| 6. | Indian Institute of Technology, Madras. | - Photo diodes |
| 7. | Indian Institute of Technology, Kharagpur. | - Phosphors for displays |
| 8. | Nagarjuna University, Nagarjuna Nagar. | - LCDs. |
| 9. | Central Electronics Ltd. Sahibabad. | - LEDs, LCDs, Solar cell Panels. |
| 10. | Bharat Electronics Ltd. Bangalore. | - Plasma and fluorescent displays. |
| 11. | Panjab Display Devices Ltd., Chandigarh. | - LCDs and Plasma display |

## Present Status and Future Scope

The production of display devices in India is very small at present. A few units have started production of some of these devices. For example,

- Photo transistors are manufactured by BEL, Bangalore.

- Visible LED lamps are manufactured by CEL, Sahibabad and Hindustan Conductors, Bombay.
- LED 7 segment displays are manufactured by CEL.
- LCD displays are manufactured by CEL, and Punjab Display Devices Ltd., Chandigarh.
- Photo cells are manufactured by a few units.

and fluorescent and plasma displays upto 2" size have a manufacturing programme in BEL.

Large size character displays are also not available. One or two units are trying to develop them. Most of the requirements at present for these devices are met by imports. According to the presently available information, about 5.6 million worth of display devices were imported during 1976-79.

IMPORT OF DISPLAY DEVICES AND OTHERS DURING 1976-79

(in Rs thousands)

| S.No. | Item | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|---|
| 1. | Photodiodes | 24 | 32 | 132 | 99 |
| 2. | Phototransistors | NA | 12 | 16 | 25 |
| 3. | Photocells | 309 | 444 | 266 | 228 |
| 4. | Couplers | 151 | 66 | 204 | 158 |
| 5. | LEDs and laser diodes | 171 | 557 | 1,048 | 715 |
| 6. | LCD devices | NA | 8 | 106 | 506 |
| 7. | Fluorescent display tubes | 69 | 27 | 19 | 22 |
| 8. | Display tubes | 757 | 1,063 | 620 | 387 |
| | Total | 1,427 | 2,209 | 2,411 | 2,140 |

The demand of the display devices depend upon the growth and products. In the case of displays, such as, liquid crystal displays, light emitting displays, plasma displays, fluorescent displays required for calculators, wrist-watches, clocks, measuring instrument etc., the demand directly depends upon the production of these items.

At present the maximum demand for display is for the electronic calculator industry. Desk type, hand held type, scientific, simple fractions and programmable calculators are being made in India. The production of calculators in 1979-80 was 0.167 million number and is expected to be about 0.2 million number in 1980-81. A number of units have started manufacturing digital watches and clock. In 1979-80 about 50,000 (digital) electronic watches, worth Rs 14 million were manufactured in India. The electronic watch industry is expected to get a good boost in production in the near future and its production is estimated to reach a level of 1.5 million pieces per annum by 1984-85. The demand estimates of fluorescent and gas discharge displays photodiodes, photo transistors, photo cells and photo couplers are based upon the present import figures and consumption pattern.

## Conclusion

The display devices form an important segment of electronic component industry. In India, several organisations have initiated R & D work in this area and some of the devices, like, photodiodes, photo transistors, photocells, visible LEDs black and white, numerical LCDs, fluorescent and plasma displays have been developed. The market size of these devices is steadily growing and in the next few years it is expected to attain a significant level. (BSR)

*Section IV*

# Current Technical Literature

Copies of articles/documents listed in this section are available on payment of Rs 5/- for the first 5 pages or part thereof and Rs 1/- for every subsequent page of the photocopy or xerox copy of the article/document. While placing the order, please mention the CTL number of the SENDOC Bulletin.

| Subject Index | CTL Nos. |
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| Dairy Products | 374-375 |
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| Small Industry | 359-364 |
| Textile and Fibre Industries | 369-373 |

# CURRENT TECHNICAL LITERATURE

## RESOURCES

### Energy Sources

365. AMARATUNGA, M.: Integrated biogas systems. Regional Journal of Energy, Heat and Mass Transfer, 1980, 2(1), 45-49.

This paper examines the conditions existing in Sri Lanka today which seem to provide an almost ideal setting for implementing biogas technology. Some of these conditions are common to a number of countries in the world and such integrated systems can serve as the developing world's alternative to breeder reactions.(AA)

366. CHAVADEJ, S.: Anaerobic filter for biogas production. Regional Journal of Energy, Heat and Mass Transfer, 1980, 2(1), 31-44.

Reduction of the capital cost of a biogas digester can be achieved through reduction of the digester volumes using anaerobic contact or anaerobic filter processes. A laboratory study was conducted to evaluate the performance of anaerobic filter in production. of biogas from diluted and screened pig waste having 30,000 mg/l of COD. The filter packing media were bamboo rings of about 1 $^{1}$/2" diameter and 1" long. The bamboo-bed anaerobic filter functioned satisfactorly over a wide range of COD loading from 3.74 to 15.6 kg/3/d corresponding to the hydraulic retention of 8.47 to 1.68 days. In practical application of the bamboo-bed digester, considerations must be given to the gas collecting system and clogging problem. This study pointed out the potential of the bamboo-bed digester in producing biogas from both detested and strong animal industrial wastes. (AA)

367. HALANGODA, A.Q.: Biogas - A solution to our fuel crisis. Regional Journal of Energy, Heat and Mass Transfer, 1980, 2(1), 59-62.

368. SUWAL, P.N.: An overview of biogas programme in Nepal. Regional Journal of Energy, Heat and Mass Transfer, 1980, 2(1), 9-12.

## TEXTILE AND FIBRE INDUSTRIES

369. ADHYARU, P.H et al: Appropriate textile technology for India. The Indian Textile Journal, 1980, 91(1), 3,55,57,59, 61,63,65,66,69,71,73,75,77,79,81.

This paper attempts to analyse the relevance to developing countries of some alternative technologies available for different stages of textile manufacture. Its scope is restricted to the main apparel fibres, namely cotton and man-made fibres. The discussion is based primarily on the profile of textile manufacture in India, where a wide range of technologies and scales of operation exist.

370. BHAGWATI, A.K.: Textile machinery industry in retrospect and its future plans. The Textile Industry & Trade Journal, 1980, 28(3-4), 1-11.

Reviews the textile machinery industry giving the production, present status, remedy for modernisation with important statistical data. (CV)

371. CHAKRABORTY, A.C et al: Processing polypropylene staple fibre. Indian Textile Journal, 1980, 90(12), 115-123.

Polypropylene, the recent synthetic fibre, has been growing rapidly both from production as well as consumption point of view. Although it is in direct competition with jute, in India, it can boost up the jute export if properly utilised. The importance of processing this synthetic fibre in jute machinery, as also its blending with jute is stressed.

372. JOSEPH, K.V et al: Information systems and ;r procedures for textile mills. Textile Machinery Accessories and Stores, 1980, 16(2), 13-17.

Attempts to present an information system designed for the textile industry and to prescribe the working procedure for the designed system; also aims to calculate the manpower requirements if the system is followed and the prescribed procedures adhered to. (CV)

373. SABHANEY, H.W.: Basic problems of textile industries. The Indian Textile Journal, 1980, 91(1), 83-84.

The appropriate technology required in a developing country has been discussed specially emphasizing the machinery involved and showing how modernization should consider the economics and the return on investment.

## FOOD AND ALLIED INDUSTRIES

### Dairy Products

374. ----: Dairy machinery industry: problems and prospects. Industrial Researcher, 1981, 8(1), 59-63.

The development of a rural-urban continuum calls for the design of an integrated programme for reorganising the Indian dairy development plants in a way similar to the Khaira plant in Gujarat. The types of dairy machinery and equipment being manufactured in India, the imports/exports of such machinery, and an estimate of demand are discussed. (JBS)

375. ----: Infant milk food - A feasibility study. Industrial Researcher, 1981, 8(1), 65-73.

Estimates the demand for infant milk food in 1983 taking into consideration the urban birth rate, trend in per capita consumption and the prescribed nutritional requirements. Gives details on the manufacturing process of the products, the cost of production, the likely profitability and other financial aspects. (JBS)

SOAPS AND DETERGENTS

376. ----: Fluorescent brightening agents. Chemisphere, 1980, 4(49), 29-31.

Summarizes the factors that influence the use of fluorescent brightening agents. (MSR)

377. ----: PCS: A new detergent enhancer. Household & Personal Products Industry, 1980, 17(7), 77-78.

A new source has appeared in the U.S. for a relatively raw chemical, in a brand new form, to increase the detergent performance of today's already effective heavy-duty detergent compounds. Known as sodium percarbonate, micknamed as PCS, the new material is a 'persalt'. It is said to increase the laundering capabilities of commercially available detergent formulations and washing compounds. In addition, PCS provides safe, effective bleaching and stain removal for textile and table-ware, as well as cooking utensils and food containers. (BS)

378. HART, R.: Chelating agents in detergents and speciality chemicals. Soap, Cosmetics Chemical Specialities, 1980, 56(6), 39,40,48A,48B.

Chelating agents of the EDTA - type are certainly familiar to most detergent chemists for their wide usage in a broad range of formulations, used primarily for their pronounced effect on metal ions such as iron, copper, manganese and on water hardness. Chelating agents possess additional related properties of interest to the formulator. This paper explores both of these aspects of amino acid chelating agents. (BS)

PERFUMES, COSMETICS & TOILETRIES

379. ----: Cosmetics and toiletries in Germany. Soap, Perfumery & Cosmetics, 1980, 53(9), 543,545,466,5 49.

Provides a general impression of the consumption and production of, and trade in, body-care and cosmetic products in Federal Republic of Germany (BS)

380. ----: Guide to contracts services. An alphabetical list of companies offering product formulation, manufacture and/or product filling and packaging facilities in UK. Soap, Perfumery & Cosmetics, 1980, 53(11), 6 9,661,662,664,667,669,687.

381. ABRUTYN, E.: Beeswax vanishing cosmetic raw material. Drug & Cosmetic Industry, 1980, 127(4), 46,48,50,136-138.

Some naturally occuring raw materials are derived from finite sources (e.g. petroleum) and others from replenishable sources (plants and animals). One material with dwindling availability is beeswax, which has played an integral part in a large variety of products over the years. Natural beeswax always has suffered from advantages in availability, price, quality and consistency fluctuations. Enumerates the formulations based on beeswax.

382. STEVENS, E.P & STEUERNAGEL, C.R.: Microcrystalline cellulose in cosmetics and toiletries. Manufacturing Chemist and Aerosol News, 1979, 50(6), 53-55 & 56.

Microcrystalline cellulose is well known as an excipient for pharmaceutical tabletting; however, the binding value of this material has recently been enhanced thus widening its range of applications. Gives some of the applications of microcrystalline cellulose in the formulation of cosmetics and toiletries. (BS)

383. TAGUCHI, M & KUNIMOTO, T.: Jojoba wax in cosmetic creams and lotions. Soaps, Detergents & Toiletries Review, 1980, 10(9), 24-2[illegible].

Discusses the properties and specifications of crude jojoba oil together with deodorizing and decolorizing the same. Gives the cosmetic preparations containing jojoba wax. (BS)

384. UNGER, L.: World consumption of cosmetics, fragrances and toiletries 1973-1978. An overall industry survey. Soap, Perfumery & Cosmetics, 1980, 53(9), 516, 517, 519 & 20.

Gives the world consumption according to product categories, per capita consumption and overall industry appraisal & outlook. (BS)

## MECHANICAL ENGINEERING

385. ----: Agricultural tractors: Outlook for the eighties. Industrial Researcher, 1981, 7(4), 259-263.

Reviews the present status of the industry, production and import/export trends, and the likely demand for tractors in the mid-eighties. (JBS)

386. --- : Commercial vehicles-scope for the eighties. Industrial Researcher 1981, 7(4), 251-257.

The production of commercial vehicles in India has increased substantially from a meagre 4700 in 1948 to nearly 60,000 vehicles in 1979. An analysis is made of the present status of the industry, estimated demand, export potential and the scope in the eighties. (JBS)

387. ----: Market study on automobile ancillaries. Industrial Researcher, 1981, 8(1), 27-39.

The present study attempts a market and demand assessment of only those few items that may be considered important in terms of demand and production. These items are: Clutch plates/discs, steering gears, starter motors, voltage regulators, generators distributors, shock absorbers, brake linings and carburettors.

388. AUSTIN, R.M & FLITNEY, R.K.: Dynamic seals (Technical file No. 81). Engineering, 1980, 220(9), I-VIII.

Presents all types of flexible seals and their correct application. Good seals are essential to the reliability and efficienty of modern machinery. As the users demand higher speeds, pressures and temperatures, in the interest of better productivity, the seal can be the critical component. Its failure can lead to expensive loss of production or potential danger to personnel and plant. (MVS)

389. MASING, W.E.: Quality: basis for profit. Chemical Weekly, 1980, 26(10), 93-96.

Discusses the impact of quality control on the price of the product. Demonstrates how quality value function slows down after reaching 100% satisfaction. Gives some suggestions for the management who take quality cost control seriously. (MSR)

390. VENKATAKRISHNAN, A.R.: Inventory techniques-simplified. Indian Chemical Journal, 1980, 11(10), 33-37.

Inventory management is a specialised field. Literature available on this subject are limited and theoretically-oriented and not suitable for Indian conditions. Any management therefore face a difficult uphill task to keep an optimum level of inventory An attempt is made here, probably for the first time, to simplify the subject through practical-oriented approach.

## METALLURGICAL INDUSTRIES

391. ----: Oxy-acetylene gas welding: its history. Industrial Welder, 1980, 10(10), 11-12.

392. GUPTA, S.R et al: Recent trends in welding cast irons. Tool & Alloy Steels, 1980, 14(6&7), 199-203.

Reviews the various problems encountered in welding of cast irons and suitable procedures for their successful welding, requirement of preheat and post- heat treatments, preparation of edges, selection of suitable filler metals, fluxes and the codification of certain standard welding processes to suit the requirements.

393. JANA, S.R.: Welding metallurgy of steels - an introduction. Industrial Welder, 1980, 10(9), 11-16.

Discusses the various arc welding processes, transformation characteristics of steel and weldability. (CS)

394. SAMPATH KUMAR, K.: A review note for the welding technologists. Industrial Welder, 1980, 19(10) 21-22.

Welding of austenitic stainless steel is briefly discussed. (CS)

## ELECTRICAL INDUSTRIES

395. ----: Electric fans - indigenous and export prospects. Industrial Researcher, 1981, 7(4), 289-296.

Examines in detail the present state of the electric fan industry in India, the export prospects and indicates an assessment of future demand.

396. ----: GLS lamps - a feasibility study. Industrial Researcher, 1981, 8(1), 19-26.

Reviews the present status, installed capacity, production, exports demand envisaged, manufacturing process, cost of the project and profitability.

397. ----: Scope for the power cables industry during the decade. Industrial Researcher, 1981, 7(4), 279-282.

Power cables industry constitutes a vital link in the generation, transmission, distribution and consumption of energy. The per capita consumption of power in India is only 85 units. At present, there are 12 units manufacturing PVC/PILC cables with an installed capacity of 39,328 kms per year. XLPE cables are also being manufactured since 1978. Production, exports, apparent consumption, performance of power cables manufacturers, and growth prospects in the eighties are discussed. (JBS)

## ELECTRONICS INDUSTRIES

398. ----: Economy and industry: Santa Cruz electronic export processing zone-analysis of problems and prospects. Industrial Researcher, 1981, 8(1), 5-12.

Surveys the infrastructural facilities and services offered, the past performance as well as the problems and prospects that lie ahead for the zone. Annexures include export processing zones in other countries and the major incentives offered, the items that are being manufactured with foreign collaboration, if any, in the SEEPZ-approved units, with full address of the manufacturers, and the product ranges exported from the zone. (JBS)

399. ----: Industry profile: Tape recorders. Industrial News Digest, 1980, 3(9), 3-4.

Tape recorder assembly started in India in 1972-73 in a very small way with completely imported kits where only few connections had to be made by the manufacturers. This was the state till the end of 1974. Thereafter, cabinets for tape recorders and electronic circuitry were made in the country whereas tape deck mechanism, motor, head and record-play switches were being imported. Many items like tape-deck mechanisms, record playback switches, etc. have now been indianised and are being manufactured in the country. Production and export data are also given.

400. ICHINOSE, E.: Ceramic materials achieve exotic applications. Journal of Electronic Engineering, 1979, 16(154), 37-40.

Discusses the applications of ceramic - materials, which are used as IC substrates, dielectric, piezoelectric and semiconductor materials.

# SENDOC Services

Featured in this section are technical enquiries that were received and the services rendered by SENDOC during the month of June, 1981. The charges for short technical enquiries will be Rs 5/- to Rs 10/- per typed page. Industry profiles already available with SENDOC are charged at the rate of Rs 10/- each.

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| 12. | S.I. Andhra Pradesh | Profiles on: Surgical Instruments, Aluminium Re-rolling Mill, Rubber Rollers, for Modern Rice Mill, Soap based Detergent Powder, Plywood Industries |
| 13. | S.I. Karnataka | Profiles on: Saponine from Soap Nuts, Magnesium Oxychloride, Collapsible Tubes |
| 14. | S.I. Madhya Pradesh | Profile on: Printing Ink |
| 15. | S.I. Maharashtra | Profiles on: Welding Electrodes, Printing Press, Paper Bags, Gem Clips, Chlorine Tablets, Phenyle, Bleaching Powder, Solder Flux for Jointing Aluminium, Soda Ash |
| 16. | S.I. Orissa | Profiles on: Cold Storage, Reinforced Cement Concrete Spun Pipes, Tarpauline |
| 17. | S.I. Uttar Pradesh | Profile on: Plaster of Paris |

**Note:** Ent. - Entrepreneur; S.I - Small Industry

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*Section I*

# New Products and Processes

## AGRO BASED INDUSTRIES

### Continuous Cellulose-to-Glucose Process

A 1 ton-per-day demonstration plant to hydrolyze cellulosic waste continuously to glucose syrup has been built by New York University engineering professor Walter Brenner at the University's Westbury, L.I., N.Y. laboratories. This technology may improve production economics of fermentation ethanol from wood, pulp and paper, agricultural and municipal wastes as a gasoline additive.

Continuous hydrolysis of cellulose is part of an Environmental Protection Agency project for conversion of solid waste to fuels. A second part of this project is continuous anaerobic fermentation of some of the glucose syrup to methane, which might serve as fuel to distill ethanol produced from the rest of the glucose. Methane fermentation is under development by microbiology professor V.R. Srinivasan of Louisiana State University, Baton Rouge.

The next step at NYU will be scaling up of continuous hydrolysis of cellulosic wastes to a 20 to 50 ton-per day plant and development of mobile units bearing plants of this size. Solid waste research project officer Charles Rogers at EPA facilities in Cincinnati envisions eventual processing of wastes into glucose syrup by mobile plants in the field and shipment of syrup over short distances to local fermentation plants. Rogers estimates ethanol might be produced by this means for 85 cents to $ 1.00 per gal - 60 cents per gal for cellulose hydrolysis and 30 to 40 cents per gal for fermentation and distillation.

Brenner borrowed a leaf from plastics processing technology and developed his continuous plant around a twinscrew extruder. He has been running the plant on sawdust or pulped newspaper. Sawdust or a slurry of newspaper pulped in a hydropulper is cream-fed into a ZDSK 53 twin-screw extruder from Wermer & Pfleiderer Corpn., Waldwick, N.J. The screws shear sawdust into a slurry without added water.

Superheated steam heats the slurry to 450°F in the extruder barrel. The configuration of the screws in the feed section removes water from the slurry and compresses the cellulose into a dense plug. The cellulose plug prevents 500-psi pressures in the extruder barrel from expelling slurry back through the cream feeder. This "expressed" water is vented at the bottom rear of the barrel. Cellulose concentration in the slurry thus increases to 50% in the barrel from 30% in the cream feeder.

Near the outlet of the barrel, 0.5% sulphuric acid is injected into the slurry. Reaction time is only about 20 seconds before the mixture is quenched by sudden cooling on leaving the extruder. This combination of temperature and residence time results in maximum 60% yield of glucose while avoiding acid-catalysed degradation.

Brenner chose the ZDSK 53 because of its modular construction. Modular barrel construction allowed complete instrumentation of the machine while the process was under development. Modular screw construction let Brenner design screw configurations by sections to get compressive action in the feed section, high shear rates in the centre, and best transport of glucose syrup to the outlet. He also could select stainless steel screw and barrel modules in the reaction section, limiting use of that costly material to the area in contact with hot acid.

Twin-screw extruders are favoured for plastics compounding and polyvinyl chloride extrusion because their high shear make plastic melts easier to process at relatively low temperatures. This same high shear grinds cellulose fibres further, making the cellulose more accessible to chemical reaction. It also overcomes non-Newtonian flow characteristics of cellulose slurries.

The ZDSK 53 is a corotating machine - the screws turn in the same direction. The resulting open channel allows densified slurry to transfer from one screw to another, facilitating transport down the barrel. Warner & Pfleiderer engineers say that closed channels of counterrotating machines, which also are used in plastics extrusion, might cause slurry to build up and the screws to jam.

To hold pressures in the barrel while allowing glucose syrup to exit, Brenner installed an intensive-service, 2-inch ball valve at the exit port. This valve, supplied by Kamyr Valve Co., Glens Falls, N.Y., and much used in the pulp and paper industry, opens for only a few microseconds at a time, Brenner says. The valve seat and ball are stainless steel, armored with wear-reducing alloy. The ball and stem are one piece for better control, and the stem is thicker than usual to take the constant torque of opening and closing. Gaskets are made from graphite to take high temperatures.

Current energy consumption is about 1600 Btu per lb. of cellulose. Brenner says efficiency might be increased by insulating the extruder barrel and quenching the reaction mixture with a heat exchanger.

Srinivasan is evaluating glucose syrup from Brenner's continuous hydrolysis as a nutrient for fermentation to methane. Work at LSU aims at a continuous fermenter, which would allow spent broth to exit by overflow as fast as new nutrient enters. To accomplish this steady-state operation, Srinivasan is trying to optimize the nutrient to increase the doubling times of fermentating organisms. In this way, multiplication of organisms would replace those carried out with the overflow.

The organisms under study are cultures from cattle rumen. Srinivasan is studying their trace element requirements to guage what substances must be added to glucose syrup and at what rates to lower doubling times from weeks to hours. He also is determining dilution rates needed for glucose syrup to secure most rapid growth of cultures.

## Efficient Small-Scale Ethanol Production

A research team at the CSIRO Division of Chemical Technology has devised a new method for fermenting sugary crops to make ethanol.

The process looks like being most economical in plants producing from 1 to 5 megalitres of ethanol a year. By contrast, a conventional distillery requires a capacity of the order of 50 Ml a year to achieve efficient operation.

The secret behind the efficiency of the 'solid-phase fermentation process', as it is called, in small plants is its relative simplicity. The crop is pulped and fed directly to the fermenter without prior extraction of the sugar. No water is added. The crop, with the help of a dose of yeast, 'brews in its own juice'.

According to Mr. Kevin Kirby and Mr. Chris Mardon of the Division, a solid-phase plant would cost much less to build than a conventional one with the same capacity, and operating costs would also be lower.

What is more, a solid-phase plant would produce much less liquid effluent than a conventional one. If sugar beet was the crop used, the 5 litres or so of waste produced along with each litre of ethanol would be essentially just the beet juice from which the fermented sugar had been removed.

Also, the fact that the effluent would probably come from several small plants dotted across the countryside and not from a single large distillery should minimize any threat to the environment.

The team achieved favourable results in laboratory trials with sugar beet. The yield was much the same as from conventional processing, with 90% of the sugar in the beet pulp being converted to ethanol. Approximately 95% of this was extracted, and 85% of the yeast was recovered.

Mr. Kirby and Mr. Mardon are keen to try out the method on a larger scale. They are looking for industry collaboration in a pilot-scale study with a plant up to a capacity of 1 kilolitre per year. They expect such a study would take at least 3 months.

The process is of the batch type. In this regard it differs from newly developed continuous fermentation processes that offer economies of scale when distilling out more than say 100 Ml of ethanol a year.

In the laboratory, the CSIRO team uses a prototype pulper built by Kingston Engineering of Smithton, Tas., to chop the beet into 3-mm pieces. Fermentation takes place after adjustment of the pH to 4.5 and addition of yeast. The resulting yellow mash is squeezed through rollers and the extract fed to a centrifuge for removal and recovery of the yeast. The alcoholic juice is then pumped througn a heat exchanger into the still.

The main cost saving (about $ 200000 for a plant of 1.5 Ml) occurs at this stage because machinery for hot-water extraction of sugar is not needed. Distillation is cheaper too because the alcohol juice is more concentrated.

The scientists point out that, because of their relatively small size, the pulper and fermenter could be readily made in a regional engineering works with modest local investment. They believe a complete 4 Ml solid-phase plant would cost about $ 900 000.

They calculate that a plant of this size would produce 95% ethanol for around 24 cents a litre, with the fuel selling for perhaps 27 cents. These figures are based on a yield of 70 tonnes of beet a hectare and a price of $ 14 a tonne for the roots (equivalent to $ 26.50 per tonne for the whole plant).

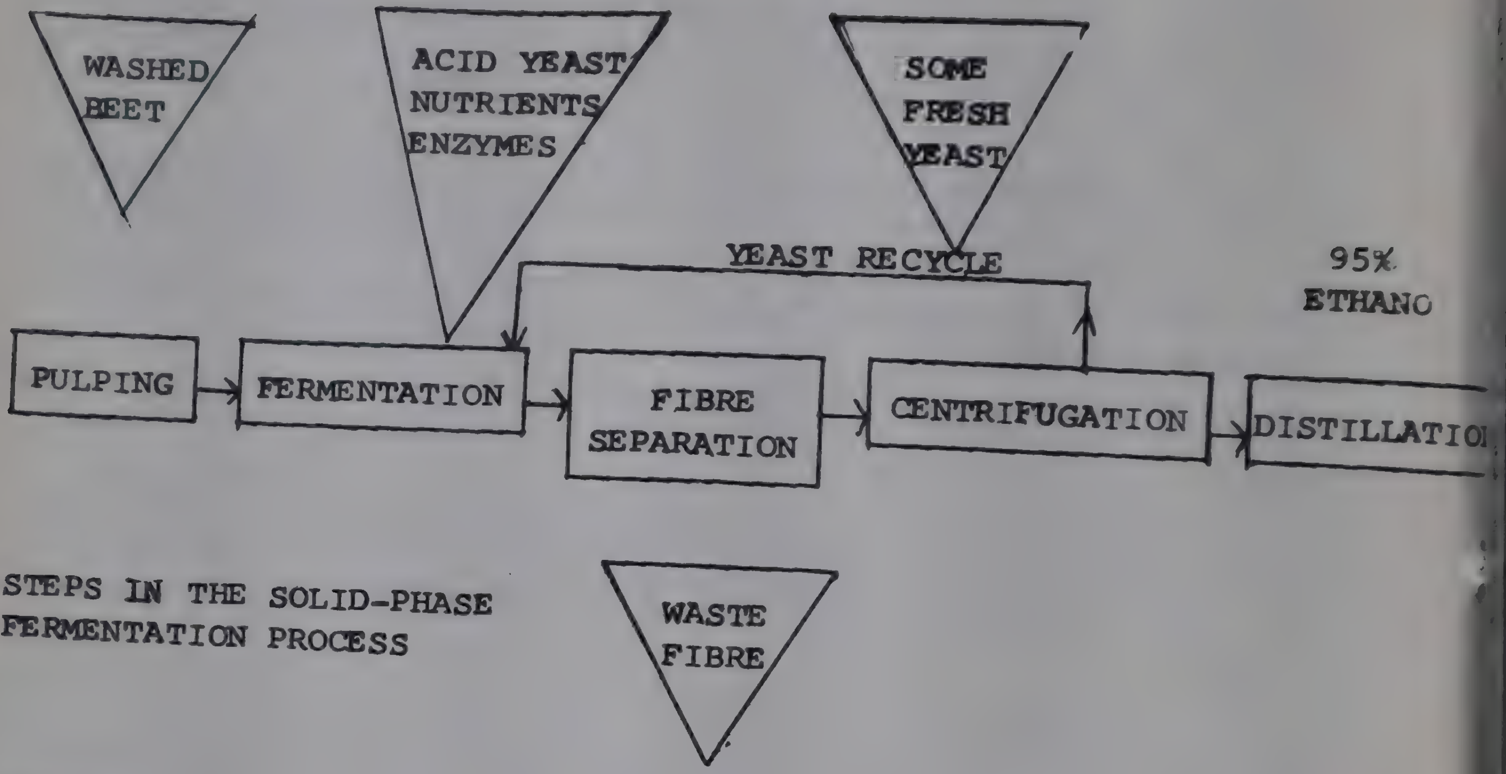
If the proposed pilot study confirms the findings of the laboratory trials, the next step would be to build a full-scale demonstration plant. Best location for such a plant would probably be in Victoria or Tasmania as both States have areas with the right climate for growing sugar beet.

As the crop can be harvested over a period of 6-7 months, farmers could include another crop in the rotation and hence ethanol distilleries would not lie idle for the other 5 months.

Mr. Kirby thinks that if beet and sweet sorghum were grown in irrigated areas of northern Victoria, they could keep a farmer-cooperative ethanol plant busy all year round. In such a scheme, farmers would use the beet tops as fodder and feed the fibrous residue from the distillery to animals.

The Division has applied for a patent to cover sugary crops, like beet and sorghum, and tuber crops, such as cassava and potatoes. Starch in the tubers presents a problem because it must be converted to sugars before it can be fermented. The scientists think it should be possible to make the conversion using commercially available enzymes and still avoid adding water.

For more information: CSIRO Division of Chemical Technology,
P.O. Box 310, South Melbourne, Vic. 3205, Australia.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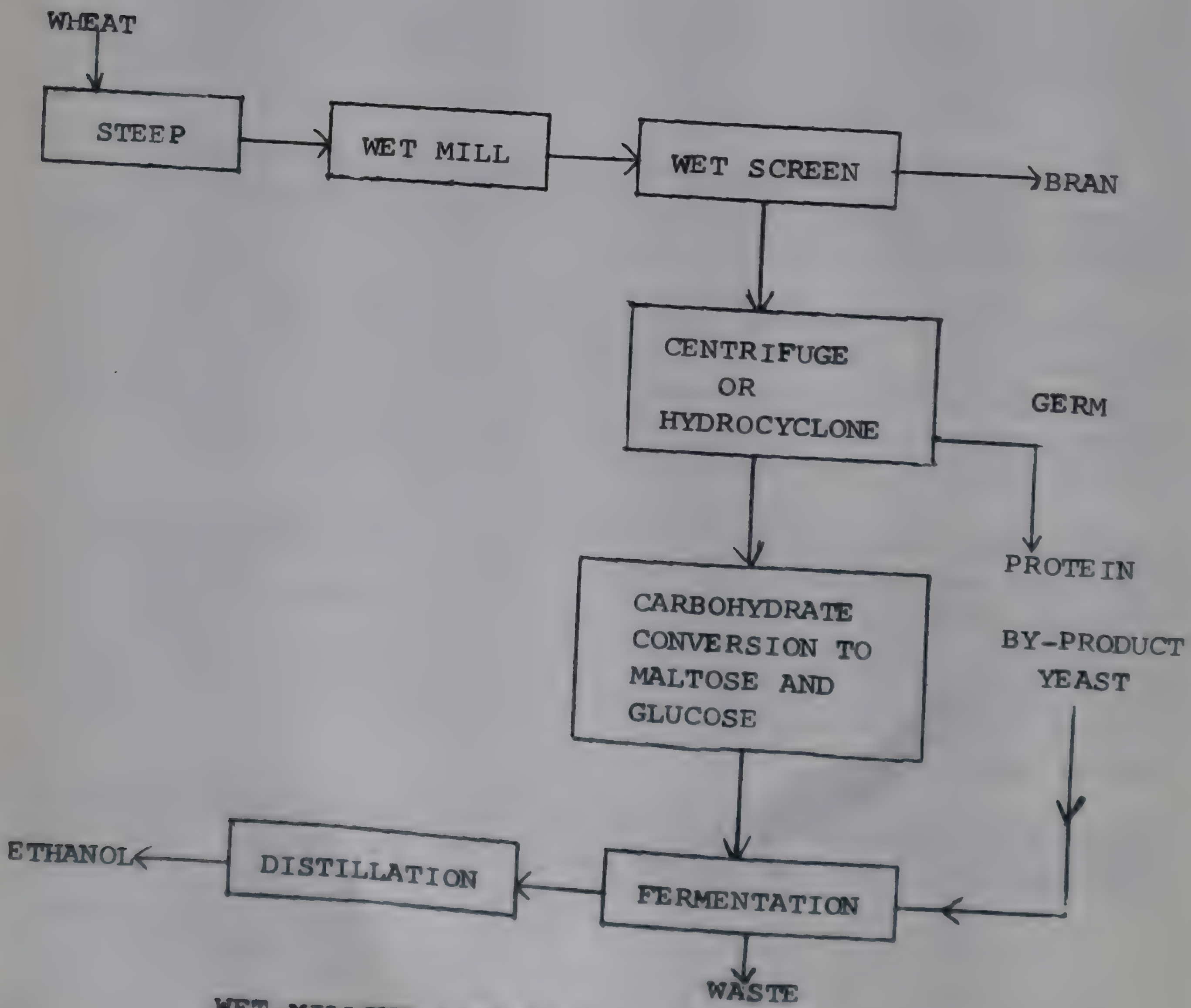
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CARBOHYDRATE CONVERSION TO MALTOSE AND GLUCOSE
ETHANOL
DISTILLATION
FERMENTATION
WASTE

WET-MILLING PATH TO ETHANOL AND BY-PRODUCTS

## Wet Milling Process for Ethanol and By-products

As part of its studies on the utilization of wheat for producing fuel ethanol, the CSIRO Wheat Research Unit has developed a process that separates the carbohydrate out of grain more completely than other methods.

By means of a 'wet-milling' process, bran, germ, and protein can be removed to leave a purer stream of carbohydrate to be fed to the fermenter.

Higher yields of ethanol can be obtained when purified carbohydrate, rather than unfractionated grain, is fermented. And there are prospects of finding suitable markets for all the other components of the grain.

Results obtained so far with laboratory-scale, wet milling equipment, designed and constructed at the Unit, have been very encouraging.

The unit is now seeking industrial partners to collaborate in the development of a pilot-scale version of the process. This would involve scaling-up by a factor of about 3000 from the Unit's apparatus which processes only 1 kg of wheat per hour.

Development of the process is being planned in cooperation with the New South Wales Department of Agriculture which is building a pilot-scale fermentation and distillation plant. The idea is that the pilot_wet-milling plant will be integrated with the Department's fermenter.

Plans call for a plant capable of handling between 0.5 and 1 tonne of wheat per hour. Such a plant, operated 8 hours a day, 6 days a week, would use about 600 tonnes of wheat per year and produce about 250 000 litres of 95% ethanol.

The Department and the Unit believe that a plant of this size is suitable for demonstrating the feasibility of the process for use on a commercial scale by farmer-cooperative groups or industrial firms.

Commercial plants might have an annual capacity of between 10000 and 100 000 tonnes of wheat. They would produce between 3000 and 30 000 tonnes of ethanol annually, or enough to treat between 30 and 300 Ml petrol to make 10% 'gasohol'.

In the proposed collaboration between the Unit and a commercial partner, the project team would develop or select suitable sieving equipment to screen off bran and germ and allow passage of carbohydrate and dispersed protein. It would assess both centrifuge-and hydrocyclone-based methods for optimizing the separation of these two components.

During the course of the collaborative project, the Unit intends to continue laboratory studies aimed at evaluating and improving the process. It will pay particular attention to the nature and properties of the protein by-product. The Department of Food Technology at the University of New South Wales is at present conducting a survey to assess the marketability of the protein. Its findings are expected to be available soon.

The laboratory work is supported by a grant from the Wheat Industry Research Council.

For more information: CSIRO Wheat Research Unit, Private Bag, P.O. North Ryde, N.S.W. 2113, Australia.

## CONSTRUCTION INDUSTRY

### Plastic Composite Panels for Partitions, Claddings and Flush Doors in Buildings

The Central Building Research Institute, Roorkee, U.P. has developed a process for producing plastic composite panels for use in partitions, claddings and flush doors. These are sandwich type panels using expanded polystyrene (EPS) beads in the core and plywood or aluminium sheets as surfacing materials. The resin used for binding EPS beads has been formulated by CBRI from indigenously available materials. It is a low temperature, low pressure phenol formaldehyde type, requiring low expenditure in mould cost and curing operations.

Preparation of boards require simple mixing, cold pressing and curing. For quick and early strength, boards may be cured at higher temperature. Production of these boards is also possible on a cottage industry or small scale industry level. Boards may be prepared with plywood on both sides or with one side aluminium which may be kept exposed to weather while using these panels as exterior claddings. Decorative PVC paper may be pasted on plywood surface for interior decoration.

The composite panels possess good sound and thermal insulation properties, built-in decoration and ease of installation and maintenance.

Composite panels numbering between 25 to 30 in different sizes upto a size of 2 m x 1 m have been produced in the laboratory. A prototype full scale 7 m long wall-to-wall partition and four number flush door shutters were installed in the Institute building. The composite panels may also be used for table tops, counter tops in furniture industry.

## Techniques for Low-Cost Housing

With the rapid growth in the population and phenomenal increase in the cost of construction materials, the problem of housing in India has become acute, necessitating the need for a study on alternate cheaper materials and methods of quicker construction. The Buildings Technology Laboratory of Indian Institute of Technology, Madras is directing its efforts to formulate techniques by adopting the pre-fabrication techniques for building elements and it has been found that partial precast system is the most suitable alternative for buildings in developing countries like India.

Five types of partial precast floor systems have been developed namely Precast RCC Joist with Celcrete infill, Precast RCC Joist with hollow concrete blocks (single and double cell), Slab with curved units and Slab with channel units by the Building Technology Laboratory.

All the precast elements used for the above floor systems are of low and medium weight which can be handled by manual labour. Besides eliminating shuttering, the above systems offer higher construction speed which is two times compared to the traditional method with solid RCC slab.

The various systems developed at the Institute are also quite economical when compared to the traditional reinforced concrete slab. The floor systems have been tested for all conditions of static and impact loading. The thermal performance of the various floor systems are also better compared to the traditional slab.

As a part of the research programme, a simple hand machine for making hollow blocks has also been developed and patented. The manually operated machine works on the lever principle. With four unskilled labourers, it is possible to manufacture 100 blocks per day which can be used for construction of walls floor and roof slab systems.

Presently number of field trial projects are being carried out to prove the utility of the partial precast system.

## ELECTRONICS AND ELECTRICAL INDUSTRIES

### Electronic Digital Clock

Digital clock is becoming more popular due to greater accuracy and display on the nixie tube and LED. These clocks employ ICs. These generally display time in hours, minutes and second and some display day and date also. Some clocks have an alarm facility for controlling an external operation. These types of clocks have wide applications in research laboratories and institutions as well as in commercial industrial organisations.

The Central Scientific Instruments Organisation, Chandigarh has developed three sizes of digital clocks:

a) The smallest size clock is designed around an LSI chip. Time is displayed in hours and minutes through a 4 digit seven segment LED display. It is ideal as a desk clock. It also has a 20-hour resettable elapsed time counter (ETC) which can be reset and displayed separately without affecting the state of the time keeper. The ETC has the added feature of displaying seconds and minutes automatically during the first 10 minutes after a reset has occured. The ETC will then display minutes, 10's of minutes, hours and 10's of hours for the remainder of its 20 hour capacity.

b) The medium size clock is based on SSI/MSI technology. The design of the main circuit is based on CMOS-ICs which greatly reduce the power consumption. Time is displayed in 6 digits, depicting hours, minutes and seconds through seven segment filament tubes which operate on 5 V and are hence TTL compatible.

c) The bigger clock has been designed around TTL SSI/MSI ICs. It displays time in hours, minutes and seconds. It is different from the other clocks in that an alarm and stop clock facility has also been provided in it. Any time correct to second can be preselected when the clock would sound an alarm and give a pulse for controlling an external operation. BCD output of time can also be provided for punching time cards in factories.

The institute has fabricated a few clocks, and their performance has been found satisfactory.

The main components required are integrated circuits, nixies, transistors, diodes, zener diodes, resistances, condensers, transformers, printed circuit board and chassis with filter. The components are indigenously available. Some storage devices, will have to be imported.

Oscilloscope, pulse generator, power supplies, multi-meter are the important test equipment needed. All these are available indigenously.

To set up a unit to manufacture 100 pieces per annum on a single shift per day basis, the investment required is estimated at Rs 0.1 million, excluding land and buildings. The unit can employ seven persons.

## Liquid Crystal Display

Displays depict information by way of digits, alphanumerics or pictures. In 1976 a new type of display emerged from liquid crystals - the Twisted Nematic Liquid Crystal Display (TNLCD) which leads the digital display field today. Its main advantages are lower power consumption and better readability under bright ambient illumination.

TNLCD is a thin film of a nematic liquid crystal material confined between two conducting glass electrodes, hermetically sealed from the surroundings. Suitable patterning of the transparent electrodes gives the desired information to be displayed. The electrodes are surface treated so as to give parallel orientation of the liquid crystal molecules. The direction of orientation on the two counter electrodes is twisted by 90°. Application of the external electric field can make the molecules orient in a perpendicular direction. This brings about change in transmittance which is visible under [illegible]ize

The nematic liquid crystals used in the early experiments were moisture sensitive making hermetic sealing of the display a must. The later discovery of stable liquid crystals like biphenyls and phenyl cyclohexanes has relaxed the sealing requirements considerably.

The technology of TNLCDs uses glass-frit sealing where the four edges are sealed with glass powder at around 550°C. As the liquid crystal material is unstable at this temperature, holes have to be drilled on to one of the glass plates through which the liquid has to be filled in subsequently and then tightly closed. The surface orientation is achieved by the obliquely evaporated layer of silicon monoxide in a vacuum chamber. These processes are expensive and are not free from blemishes in visual appeal through reverse tilt problems.

A faculty member of the Indian Institute of Science at Bangalore has succeeded in modifying both the sealing method and the surface alignment process. A polyurethane-based thermoplastic sealing technique replaces the glass-frit seal. With this, sealing can be accomplished at 120°C, a temperature at which the liquid crystal material is stable. The drop-filling method replaces the need of special holes on the conducting glass plates. The surface orientation is carried out by a chemisorbed layer of polyvinyl alcohol, rubbed on with an appropriately designed machine to yield parallel orientation of liquid crystal molecules. The low tilt angle affords higher visual contrast. Such surface alignments are found to yield LCD life time of over 20,000 hours. The area of the aligned surface is limited only by the size of the rubbing wheel. Displays ranging from 5 x 10 to 200 x 200 mm have been prepared and tested. Another achievement is the combination of batch-processing techniques with plastic sealing where a large number of smaller displays can be prepared from a pair of glass plates with transparent electrodes, plastic sealed and separated by the scribing process.

## Thyristor Fed Drives

The range of power control possible with thyristors varies from a few watts to a few megawatts. Adjustable speed drives play a very important role in industries such as steels, cement, paper and textiles and thyristor fed drives have fast response, need less capital cost, less space and little or no maintenance. The Control Engineering Laboratory in

Electrical Engineering Department, Indian Institute of Technology, Madras is engaged in developing indigenous technology in this area of thyristor fed drives. The laboratory has developed, built and tested a number of d.c. and a.c. thyristor-fed drives having reversal and regeneration capability.

A thyristor controller for wirespool unwinding has been designed, developed, constructed, tested and commissioned at site for M/s. Bharat Dynamics Limited, Hyderabad. The laboratory has successfully completed a joint Indo-German Research Project on the "Speed Control of a Squirrel Cage Induction Motor" using a thyristor power amplifier. This eliminates the transducers and uses electronic speed and slip controllers, thereby making the drive more reliable and maintenance-free. In the field of a.c. motor drive technology, the laboratory has achieved notable success and is now in a position to help the industry.

The technology of thyristor control involves interplay of several areas of electrical engineering such as electrical machines, electronics, feedback control systems and thyristors. Practicing engineers in industry trained in conventional speed control methods find it difficult to grasp this new technology. In order to help to understand thyristors and use thyristor equipment with confidence, the laboratory is organising a second intensive course on Thyristor Control from November 30, 1981 to December 11, 1981. Organisations wishing to sponsor candidates may contact the Head, Control Engineering Laboratory, Department of Electrical Engineering, IIT-Madras.

## METALLURGICAL INDUSTRIES

### Extraction of Lead, Zinc and Copper

In view of the increasing demand for lead, zinc and copper in the country, the Regional Research Laboratory (RRL), Bhubaneswar, is engaged in developing energy-saving processes to extract these metals from complex sulphide ores of lead, zinc and copper available in sufficient quantities in different parts of the country. One such process developed recently by the laboratory relating to the extraction of almost all lead, zinc and copper from the concentrates of Sargipalli ore of Sundargarh District, Orissa, is very attractive. It consists in a simple chlorination of the ore at room temperature followed by brine leaching of lead chloride and electrolysis to produce high pure lead and high pure copper and-zinc from the leached solution. The process, including benefication and metal extraction, has been standardized on a kilogram scale. Pilot scale trials are envisaged.

## Particle Coating

Scientists from CSIRO and the University of New South Wales, Australia have recently developed a method for producing a variety of coated powders.

An intense electric field is used to suspend a charged cloud of rotating and oscillating metal particles in a vacuum. This electrodispersion effect is employed to produce a uniform and durable coating of controlled thickness on the individual particles.

The novel technique is the result of research carried out by Mr. Steve Szirmai and Dr. Ed Potter of the Division of Process Technology, and Professor David Morton and Mr. Phillip Kelley of the University's School of Physics.

The process takes place in an evacuated container, with one electrode embedded in a powder bed at the base of the vessel and another positioned above it. A high electric field applied across the electrodes results in a fine dust cloud forming over the powder bed.

A vapour of the desired coating, typically a metal or semiconductor material, is then allowed to permeate the dispersed powdery particles. The electric field ensures that only the particles are coated, not the neighbouring surfaces or the containment vessel. The technique is therefore much less wasteful than the conventional vacuum deposition methods currently used to coat solid surfaces.

And the dispersed particles, having the same charge, repel each other and so don't agglomerate. Clumping together of coated particles is avoided, allowing a thorough and even coating to form.

Among potential uses, manufacture of chemical catalysts must rank high, according to the scientists. The technique would allow the use of expensive metals like platinum in high performance catalysts, because an ultra-thin layer could be applied to a cheap metal powder. The resultant free-flowing particles, with very large surface areas, would have just the right sort of properties needed for an active catalyst.

The manufacture of electrically conducting paints, which currently require a high silver content, is another area where the technique may be applied with savings in cost.

Other possibilities include the production of graphite-coated metal particles for making self-lubricating metal components such as bearings and shafts, and the manufacture of slow-dissolving coatings on pharmaceutical powders.

The division would like to hear from companies interested in the further development of this patented process on a collaborative basis.

For more information: CSIRO Division of Process Technology,
P.O. Box 136, North Ryde, N.S.W. 2113, Australia.

## Reactive Filter Media for Aluminium and its Alloys

The quality and performance characteristics of aluminium and its alloys are greatly influenced by the presence of impurities like dissolved oxygen, oxide and sodium in the melt. The reactive filter media developed have proved quite useful in removing these impurities from the melt to give an improved product. These media enable: (i) high yield of good quality product having a better surface finish, (ii) reduction of sodium level in the filtered material, and (iii) grain refinin of the product.

The product is new to the Indian market. The potential for its use in aluminium foundries is promising, as the filtrate obtained is free from impurities. Aluminium and its alloys obtained have good mechanical properties.

The requisite ingredients are mixed in the required proportions, pelletized and fired to obtain filter balls of suitable size. The filter is placed in the path of the molten stream prior to its entry into the mould cavity. A single filter bed can filter about 30 tonnes of aluminium alloys.

Predesign cost data (basis 30 tonnes/year)

| | |
|---|---|
| Land and Building | Rs 5.17 lakh |
| Plant and Machinery | Rs 1.495 lakh |
| Working Capital | Rs 0.140 lakh |
| Cost of Production | Rs 8/kg. |

Main raw materials are certain chemicals. Main equipment include gas fired furnace, mixing unit, pelletiser, drying oven. All items are available indigenously.

Five kg of filter balls have been made at the National Metallurgical Laboratory, Jamshedpur and tested on an industrial scale by leading aluminium manufacturers.

## Recovery of Tin Metal from Tin Scruff

Tin is a metal of versatile utility. Apart from its use in tin plate industry, it finds use in alloying compositions for bearings, solders, bronze coins, fusible alloys, etc. Tin is now being used in the electronic and space applications for PCBs. One of the latest uses of tin is in the preparation of float glass. The process under report concerns the recovery of tin metal from tin scruff.

The present demand for tin metal is of the order of 3-4 thousand tonnes/year, a bulk of which is met through imports. The future demand is estimated around 6000 tonnes/year. The present market price of the metal is about Rs 200/kg.

The scruff is mixed with suitable fluxes and smelted in a furnace. The crude metal thus obtained is refined in a remelting furnace. The 'hard' left on remelting is recirculated with the fresh charge. The process ensures high recovery of the metal as compared to the practices in vogue.

Predesign cost data (basis 160 tonnes of scruff/year)

| | |
|---|---|
| Land and Building | Rs 1.0 lakh |
| Plant and Machinery | Rs 5.38 lakh |
| Working Capital | Rs 1.38 lakh |
| Cost of Production | Rs 5863/tonne of metal produced |

Main raw materials are tin scruff produced during the process of plating of steel sheets (currently available from M/s. Tinplate Co. of India), fluxes, furnace oil, etc., all of which are available indigenously.

Main equipment are tilting types melting furnace, remelting furnace, ingot moulds (cast iron), temperature recording devices and graphite crucibles. All items are available indigenously.

Investigations were carried out at the National Metallurgical Laboratory, Jamshedpur on 10 Kg/batch, and about 100 Kg of tin was produced. The product conformed to IS specification 26-1966 and was found suitable for tinning on steel sheets and other purposes, by the user, M/s. Tinplate Co. of India.

# New Machinery and Equipment

## CHEMICAL PROCESS EQUIPMENT

### Electrochemical Etching Machine

A special electrochemical etching machine with electrode-etching technique has been developed by Tampoprint GmbH of West Germany. This technique is similar to spark erosion process but with simpler procedures. Specially engraved and properly insulated copper or brass electrodes are needed to be pressed upon the object to be etched in a solution of non-corrosive electrolyte. The oxidative etching process is achieved by the said pressure of the electrode via the medium of the flowing layer of electrolyte on the object with a separation of the order of a hundredth of a millimeter. A very important point is, however, the complete parallelism that has to be warranted in between the workpiece and the electrode. Otherwise, undue melting and hence distortion of the electrode will occur. The etching is achieved by means of spark in the electrolyte across the electrode-workpiece pair area.

This etching technique is said to rationalise and automate the inscription on all metallic products having plane, round, conical, concave and convex surfaces, either polished or ground.

The application fields are in precision tools having flawless and even surfaces, slide guages, milling and cutting tools and drills, ball bearings, standardized parts and machine elements. Medium and large production series can be done with fully automatic installations. The presently available models are TT100E or TS100E. The advantage of this process is the relatively long life of the etching stanchion and the part is readily finished after the etching process. Letters and designs can be etched properly to a depth of one mm.

Further information from: Sri Hansa Commercial, 41/2, Gariahat Road (South), Calcutta-700031.

## Instantant Flaw Detector for Plastics

Flaws and voids in plastics and other non-conductible materials can prove costly to remedy, especially when they occur in tankers, pipe-work and wall linings. The Goodburn Spark Tester provides portable instant detection of flaws and voids in plastics and non-conductible materials of up to 25 mm thickness and more. An improved version has now been introduced.

The operator simply passes the tester probe systematically over the material to be checked. Voids and defects are instantly revealed by the passage of a bright spark accompanied by an audible hissing, which establishes the exact location of the defect.

In particular, the tester will provide positive detection of flaws and pinholes in anti-corrosive, enamelled or ceramic linings of steel pressure vessels, tanks and pipes. It is also most effective for maintenance checks where lined and insulated plant has been in use for a considerable time, as oxidation or ageing may cause coating or covering to become brittle and crack.

The tester will also readily locate leaks in glass seals and evacuated glass systems. For details contact: Goodburn Plastics Ltd., Uxbridge, Middlesex UB8 2$E, England.

## Jet Dyeing Plant

Shakti Textile Engineers have now introduced a high temperature, high pressure, jet dyeing plant, the latest concept in textile dyeing technology, which is suitable for dyeing all types of spun and filament fabrics whether woven or knitted.

The machine ensures high productivity with completion of dyeing in only 100 minutes. A high fabric speed of upto 250 metres/min. can be maintained.

The material to liquor ratio is only 1:10, thus resulting in low consumption of power, steam and water. The plant provides a loading capacity of 120 to 200 kgs per batch. Separate jets for spun and filament fabrics are provided.

Further information can be obtained from: Shakti Textile Engineers Pvt. Ltd., Manohar Industries Estate, Chincholi Bunder, Malad (West), Bombay-400064.

## Water/Oil Test Equipment

In

In order to determine the water content in lube oil, and similar products, a Watcon water/oil test equipment has been, recently developed.

The equipment allows quantitative determination of water content in paints, lube oil, diesel fuels, gasoline and other petroleum products with an accuracy that approximate the standardized laboratory measuring methods according to IS, DIN, ISO and ASTM. The equipment operates with a chemical solution steaming the water content in the oil. Watcon does not only indicate that water is present but indicates the water content in percent. The "Watcon" unit is in a position to determine the water content between 0.05 and 2.0 volume percent of lube oil, fuels and other products. The results are available in less than 15 minutes.

The unit is claimed to save time and money and should find application at works, in laboratories, and on board seagoing vessels. For more details contact:

M/s. Laboratory Equipment Corporation, Bombay Poona Road,
Poona-411034.

## ELECTRONICS AND ELECTRICAL EQUIPMENT

### HV Insulator for Dirty Sites

A fused, self-releasing test clamp from Britain is believed to be the simplest device available for measuring and comparing the performance of h.v. (high voltage) powerline insulators under damp conditions and in heavy atmospheric pollution.

Series 987 clamps can be used to measure overall insulator performance, to compare the efficiency of different types of insulator, or to measure the severity of site pollution. There are two versions of the unit: Type 9871 is for use on the metal cap of one of a string of disc insulators; and Type 9872 is designed for long-rod insulators. Both versions operate on the same principle acting as releasable earthed instruments, and may be employed singly or in tandem.

The clamp reduces the effective length of an insulator string so that the insulator flashes over when its surface is wet or polluted. This flashover is intercepted by the clamp, whose explosive fuse is fired so that the device falls free of the insulator. A built-in delay of at least 500 msec ensures that theclamp is released only after the main circuit-breaker has cleared the fault.

Design of the clamp ensures that, although freed from the insulator string, it remains suspended to indicate clearly to an engineer at ground level that flashover has occurred. The use of several instruments on the same insulator or insulator string permits several flashovers to occur, increasing effective insulator length, until a withstand or working level has been reached.

Test results can be used in two ways. Comparison of the withstand lengths of different materials indicates the most suitable insulator type for a given area. Alternatively, comparing the withstand lengths of the same type in different areas shows both the comparative degree of pollution and the optimum length of insulator under particular site conditions.

After test results have been noted by an engineer, who merely counts the number of clamps left in place, the devices can be moved to another site for a new test series.

Models of the tester are available to fit the porcelain sheds of long-rod and motor insulators from 150 mm to 290 mm in diameter, and the metal caps measuring from 67 mm to 177 mm in diameter of insulator discs. Maximum short-circuit capacity of the devices is 20 kA for 300 msec.

Dimensions depend on the type and size of insulator to which the clamp is to be fitted, but nominal length is 330 mm, nominal width is also 330 mm, and overall thickness is 110 mm, but should not exceed 30 mm over a radius of 250 mm from the insulator's centreline. Weight depends on specification and is typically 2.8 kg. The clamps may be used at ambients from 5°C to + 50°C.

Manufacturers: Clarke Instruments Ltd., 91a High Street, Camberley, Surrey, England.

## Power Demand Control Systems

For the first time in India, Yashmun Engineers Limited, offer total and automatic demand control systems as a complete solution to the pressing problems of power restriction on industries-small, medium or large sized. One of the salient features of these systems is that they enable the consumers comply with the restrictions without production cut-back and at the same time help in attaining measurable savings on power bills every month. These systems are fully indigenous and incorporate two methods of control viz. instantaneous rate with time delay control and ideal rate control to suit varied industrial requirements and are offered in five different models. No operational or maintenance costs are involved in normal use of these systems.

These systems have been develped as a result of continuous research and development by the Testing Department and the Special Projects Division of the Tata Electric Companies, development principals of the above firm. Enquiries may be addressed to Yashmun Engineers Limited, Tata Vidyut Karyalaya, Murzban Road, Bombay-400001.

## Safety Alarm

An electronic I.C. circuit safety theft-cum-burglar alarm designed and developed by an engineer, Mr. Vinod Kumar Malhotra (F/C 92, Tagore Garden, New Delhi-110027) can be used at various places.

A car fitted with this device can be parked at any place since the moment a thief tries to break open the dicky, bonnet or door, the horn will start blowing and the ignition system will get disconnected. Horn blowing cannot be stopped by closing the door or tampering with the wiring system. It can only be stopped by the hidden master switch and thereafter automatically the ignition system will start working.

Foot or hand-operated small switches are useful in the case of lockers. A simple press of the switch will give information about the thief with light glowing and feeble voice coming to attract the attention of the people concerned. The manager/owner will get about 8-10 seconds to take appropriate action and after that automatically, an electronic siren will start blowing.

The complete device ordinarily works on 220 volts supply but its operation remains undisturbed if power is cut at any time of the operation of the equipment. The device can operate on main supply wherever available. The siren can be stopped by a simple switch fitted in the strong room. A provision can also be made for taking a photograph of the hall when the siren starts blowing.

In the case of locked houses, if any intruder tries to enter through window or ventilator, an electronic stren will keep on blowing till it is stopped by means of a master switch. This device also operates on 220 volts supply but continues to be operative even in the absence of power for 72 hours.

For houses there are other devices as well. For example, if the intensity of light from bulbs falls below the stipulated level, the situation can be rectified. The device for the purpose is switched off automatically in the morning.

All the systems, it is claimed, are very simple to install and the prices, according to the manufacturer, are within the reach of the common man.

## Tractor-powered Generators

Gear-driven generators developed by a British firm enable farmers who own or have the use of a tractor to obtain an instant supply of non-mains electricity anywhere on the farm. Although primarily intended for use on farms to meet both emergency and everyday working needs, the generators can also be used on other sites, such as forestry and construction locations, to provide lighting as well as power for a variety of tools and equipment.

Called Tract-A-Power, the generators are designed to work from the power take-off (pto) system of any tractor and are offered in a range of 16 models providing 220/240 V single-phase and 240/415 three phase 50 Hz supplies at 1,500 rev/min. Models operating on other voltages and a frequency of 60 Hz at 1,800 rev/min. can also be supplied.

Outputs of individual models range from 3 to 55 Kva, sufficient to power a wide range of equipment independently of mains supplies as and when required. During a power cut on the farm they provide an on-the-spot emergency supply for general-purpose lighting, cooking and heating, and play a particularly important role in operating essential services whose interruption could result in considerable loss to farmers. Examples include operating, milking and milk cooling machines, freezers and heating/ventilating/lighting equipment used in battery and boiler houses, greenhouses and piggeries which require continuously maintained temperature and lighting conditions. Other applications include operating animal feed crushers, power saws and drills, hedge cutters, fencing tools, sheep shears and (on larger farms) conveyor belts for the supply of animal feedstuffs and for loading farm produce on to transport vehicles.

The generators use brushless alternators directly coupled through a gearbox to the tractor's p.t.o. system. A standard linkage shaft connects the gearbox to the p.t.o., a simple procedure taking only a few minutes. For lifting and transportation, the whole generator unit is designed to fit the tractor's three-point category 1 or 2 lifting mechanism.

In operation, the gearbox increases the tractor's 500/540 rev/min p.t.o. shaft speed to 1,500 rev/min (or 1,800 rev/min on a 60 Hz supply) to synchronise it with the generator's operating speed. Use of a gearbox instead of the more conventional belt driven system used on equipment of this kind eliminates the problem of slip and therefore offers a more reliable output and the whole unit is claimed to be safer, more compact and easier to maintain.

In their basic form, the generators are supplied with a mounted control panel incorporating a frequency meter (to monitor alternator speed) and output socket, although additional items, such as a voltmeter, selector switch, ammeter and circuit breaker can be included as optional extras. Each model is mounted on a heavy-duty steel frame for robust outdoor handling. The smallest 3 kVA single-phase model weighs 155 kg. and the largest 50 kVA three-phase model 385 kg. Respective overall dimensions (length x width x height) are: 940 mm x 750 mm x 1 m.

A welding transformer can be fitted to the generator as an optional extra. Producing between 45 A and 160 A, the unit can be used with a wide range of electrodes for on-the-spot welding jobs on the farm or other sites.

Manufacturers: Shannon Power Services Ltd., Leigh Street, Walshaw, Bury, Lancashire, England.

## ENGINEERING EQUIPMENT

### Chamfering Machine

Flat metal components of machine tools, such as the table of a drill press, have their sharp edges bevelled or chamfered away before being fitted in place. Till recently, no special machine existed for doing this job.

The new ABC chamfering machine was designed by a toolmaker for his own use, but its wide applicability has resulted in commercial production. The machine consists of a belt sander operating inside a metal box. The top of the belt protrudes through a hole in a tilted metal table atop the box, so that it can grind off the edge of a metal component that rides back and forth along a guide rail.

The chamfering machine can use the full range of some sixty available commercial abrasive belts, and belt changes are quickly and easily made. The operator can adjust the size of the cut by raising or lowering the belt. A special table top is available for handling large metal components.

Further details may be obtained from: A.B.C. Hansan Comp. A/S. P.O. Box, 3054, DK-1508 Copenhagen V, Denmark.

### Compound Impactor for Cement Plants

Single stage crushing of limestone for the manufacture of cement is being introduced for the first time in India with the fabrication of a double rotor compound impactor by Utkal Machinery Ltd. (UTMAL).

The compound impactor is being supplied to Mangalam Cements for their 1200 tonnes per day cement plant at Morak, near Kota, Rajasthan. It will crush up to 1000 mm size limestone, which will be reduced to 95 per cent below 25 mm at the rate of 275 tonnes per hour in a single pass.

Easy maintenance of the machine, in-built tramp protection system and flexibility of end product size control are its novel features. The absence of gratebars underneath ensures smooth operation of the impactor without any choking of products.

By crushing limestone in a single stage, this impactor supercedes the hitherto conventional two-stage crushing systems with jaw and hammer crushers in the primary and secondary stages of crushing respectively.

Further information from: Larsen & Toubro Ltd., P.B. 278.
Bombay-640038.

## MACHINE TOOLS AND ACCESSORIES

### Skirt Turning of Pistons

Internal combustion (IC) engine pistons are designed with non-cylindrical skirt portions to ensure trouble-free performance at high temperatures. Usually this shape is oval in the transverse section and barrel shaped or conical in the axial section. This complex shape, though deviating in magnitude from a true cylinder by only a small amount, should be maintained within close limits for satisfactory performance. To achieve this, special purpose piston grinding machines and diamond turning lathes are used.

For turning, while some lathes are fitted with special linkages incorporating cams and templates to generate this non-cylindrical shape, some others especially diamond turning lathes, employ three dimensional master cams to copy the same. It is imperative that these master cams should have a smooth profile with high profile accuracy and surface finish to meet the accuracy and surface finish requirements of the piston manufactured. As it is not easy to make such master cams in the tool rooms, their requirement is being met by imports. Also the difficulty in manufacturing the master cams has been a serious handicap in optimising the piston shapes in IC engine development.

Investigations have been carried out in CMTI for developing manufacturing process for master cams which have constant throw of ovality from section to section and barrel shape on the length. This was done by using a precision thread grinding machine installed in the institute. The principle of the process employed is as follows:

The universal thread grinding machine has, in addition to other features, relief grinding and taper thread grinding facilities. The linkage systems of these two facilities have been so designed that when they are brought into operation simultaneously, the wheel head motion resulting from one is superimposed on that resulting from the other. In the experimentation, a specially designed oval cam and a profile template were mounted in place of the relief cam and taper grinding mechanism respectively. The necessary wheel head motion was achieved when both these mechanisms were brought into operation simultaneously and the non-cylindrical shape of the master cam was ground.

In a typical application, profile accuracies of better than 0.004 mm on radius in transverse as well as axial sections have been achieved on a master cam needed by a scooter manufacturer. With extra care, higher accuracies are possible. Piston manufacturers could find this process interesting in replacing the old master cams as well as in development work in that connection. For more details, Contact: Central Machine Tool Institute, Tumkur Road, Bangalore-560022.

## Universal Milling Machine

The Universal Milling Machine Model 102 Type HLO-300 is manufactured by the Prototype Development & Training Centre, Okhla.

The machine has been designed for single and mass production of precision components. The components of the machine are manufactured from selected raw materials inspected to the exact specifications. The alignments and accuracy of the machine conform to GRADE-1 specifications of Indian Standards Institution. The machine with all its accessories is versatile and forms an indispensable equipment for modern light engineering industry.

The main parts of the machine such as pedestal, column overarm, knee with saddle etc., are so designed that the machine runs without vibration even under heavy loads.

The pedestal carries the column, base block for vertical movement of knee and the electric motor, fixed on an adjustable bracket inside the pedestal. The top portion of the pedestal has the shape of a pan for coolant, the coolant pump being located on its right side.

The column has two guide ways, in front for the knee and on top for overarm. The sliding gear shaft and the milling spindle are fixed in the column. The change gears run in an oil bath inside the column. The spindle has Morse taper No. 3 and it gives 12 speeds (100-1250 RPM) by changing the gear shaft by V-belts and through back gears to mililng spindle. The spindle and the change gears are made of high quality alloy steels which are properly heat treated.

The table slides on the guide ways of the saddle and the longitudinal traverse of the table can be operated automatic or by hand. The longitudinal traverse movement can be changed by changing a pair of change gears depending upon the nature of job. The feed gear box has three built-in feeds, fine medium and rough, which can be obtained by shifting the lever position.

For operating the automatic feed, the lever provided in the centre of hand wheel should be pulled and hand feed can be obtained by moving the wheel with lever pushed in.

The table can be swiveled either side by 20°. The table is provided with two adjustable stops for adjusting the lingitudinal traverse of movement. These stops are fixed in the 'T' slot and can be adjusted in any position. The table has three 'T' slots on the top surface for clamping the work or for fixing the accessories.

For easy operation of the machine, two switches one for 'On & Off' and the other for changing the direction of the milling spindle are fixed in convenient positions on the column.

Specifications:

Table

| | |
|---|---|
| Length & width | 700 x 160 mm |
| Number & width of tee slots | 3 x 12 mm |
| Centre distance of Tee slots | 37.5 mm |
| Longitudinal traverse | 300 mmm |
| Cross traverse | 125 mm |
| Minimum distance from left hand table end to milling spindle centre | 200 mm |
| Table swivel | 20° either side |
| Table feed automatic | 16,25,40 mm/min. |

The Horizontal Milling Machine Model 101 Type HLO-300 is manufactured by Prototype Development & Training Centre, Okhla

The Horizontal Milling Machine Model 101 Type HLO-300 is manufactured by Prototype Development & Training Centre, Okhla under licence of M/s. Steinel Machine Tool Factory, West Germany. This machine has the same specifications as that of the Universal Milling Machine Model 102 except that the vertical traverse of the knee and longitudinal traverse of the table are operated by hand wheel for slow feeds and by hand-lever for quick movement. The cross traverse of table is also by hand operation. Further the table of this machine is fixed and is not provided with swivel.

### Milling Spindle

| | |
|---|---|
| Spindle Morse Taper | No. 3 |
| Number of Speeds | 12(100 to 1250 RPM) |
| Maximum distance from table surface to milling spindle centre | 225 mm |
| Distance from milling spindle centre to lower face of overarm | 93 mm |

### Motor Main

| | |
|---|---|
| K.W. | 1.1 |
| R.P.M. | 1400 |
| Volts | 400 |
| Phase | 3 |
| Cycles | 50 |

### Motor Feed

| | |
|---|---|
| K.W. | 0.18 |
| R.P.M. | 1400 |
| Volts | 400 |
| Phase | 3 |
| Cycles | 50 |

### Vertical Milling Head

| | |
|---|---|
| 1. Morse Taper of Milling Spindle | 3 |
| 2. Spindle speed (with regard to Speeds of Milling machine) | ---ratio 1: 1.66 to High Speed |
| 3. Net weight | 42 kgs |
| 4. Gross weight | 60 kgs |
| 5. Case Dimensions | 350 x 450 x 550 |

Overall Dimensions

| | |
|---|---|
| Length x Breadth x Height | 1000 x 1020 x 1360 |
| Net weight | 485 kg |
| Gross weight | 600 kg. |

Standard Equipment

Milling arbor 22 mm; Oil gun, Spanners; sq. Box 9 mm, Single ended spanner 9 mm 10 mm, 14 mm, 19 mm & 22 mm, Ring and open end spanner 17 mm and Hex. Wrench 8 mm coolant pump.

Special Accessories

Horizontal collet chuck, vertical collect chuck, Dividing heads, Universal Diving Head, Plain machine vice, Swivelling Machine vice.

Standard equipment with vertical milling head

1. Draw Bar
2. Tee bolt for swivel mount
3. Mounting Bolts
4. Donel pin

Manufactured by:

Prototype Development and Training Centre
The National Small Industries Corporation Limited, Okhla
New Delhi-110020

For enquiries: Marketing Division
The National Small Industries Corporation Limited
Near Okhla Industrial Estate, New Delhi-110020.

# Industry Roundup

This section highlights policies and procedures, guidelines, the present status and future prospects in certain industries as well as the latest available data in respect of such industries.

## Automobile Tyres and Tubes Industry

### Introduction:

Automobile tyres and tubes industry occupies an important position in the economy of the country as it provides the tyre component to various types of vehicles which are indispensable in modern life. Besides, the tyre industry provides direct employment to about 25000 persons, the value of the annual turnover of the industry is about 4000 million (excluding excise duty). The industry contributes about ₨ 2000 million to the national exchequer in the form of excise duty. Tyres and tubes constitute the major portion of the rubber goods manufacturing industry and consume about 60% of the total rubber used in the country.

### Growth of the Industry

The industry is as much of strategic importance for war time exigencies as it is of vital significance for peace time necessities. Before India became independent, only two companies in the country namely 'Dunlop' and 'Firestone', were manufacturing automobile tyres and tubes. Both of them were multinationals. After independence, production of automobile vehicles started in India in a big way, both for commercial and personal use. The production of commercial vehicle was 1798 numbers in 1947 and increased to 27,518 numbers in 1960. The production during 1977-78 was 41,244 numbers. It increased to 60,000 numbers during 1978-79.

To meet this huge requirement of the automobile tyres, five more companies, two multinationals, viz., 'Goodyear' and 'Ceat' and three Indian, viz., 'Madras Rubber Factory', 'Premier' and 'Incheck' came into production in the beginning of 1960. But they also failed to cope with the ever increasing demand and after 1965, the country experienced a near famine in tyres; and the premium which the consumer had to pay went up very high. The future also appeared bleak. The seven companies in the market were expected to produce in 1974-75 only 47.2 lakhs of tyres as against an estimated demand of 63.6 lakhs. The demand was expected to rise further to 110 lakhs by the end of the Fifth Plan.

There are at present 14 manufacturers with 16 units engaged in the production of automobile tyres and tubes. The present installed capacity is 7.929 million tyres and tubes per annum. Additional capacity to the extent of 4.75 million per annum has been licensed. Three units with a capacity of 604000 have also been registered with the DGTD. Thus the total installed/approved/registered capacity as per the details given below adds upto 13.883 million per annum.

| | | |
|---|---|---|
| 1. | Capacity installed | 7.929 million |
| 2. | Further capacity licensed (including fuller utilisation) | 4.750 million |
| 3. | Further capacity approved by letters of intent | 0.60 million |
| 4. | Capacity registered with DGTD | 0.604 million |
| | Total | 13.833 million |

Four units namely, 'Unicorn', 'Tanfort', 'Falcon' and 'Jayesvee' are manufacturing only scooter and motor cycle and tubes. The additional capacity of 390000 and 200000 approved in the case of MRF, Madras and Inchek, Calcutta respectively is under the fuller utilization scheme. Both the companies claim that they have a built-in capacity to achieve higher production to the extent of 1 million and 500000 per annum respectively but yet to take steps towards maximum utilisation.

A capacity of about 2 million which had already been licensed, may not materialise. The likely available additional capacity in the near future will be as under:

| Year | Likely additional capacity available | Cumulative capacity |
|---|---|---|
| 1980-81 | 400000<br>(Gujarat Tyres Ltd.) | 10.289 million |
| 1981-82 | 390000<br>(MRF, Madras) | 10.679 million |
| 1982-83 | 400000<br>(A.P. Tyres) | 11.079 million |

While assessing the total demand for various categories of tyres and tubes, the requirement of tyres and tubes for new vehicles, vehicles already on road, defence and export requirements are to be kept in view. On working out the population of vehicles on road, at the beginning of any year, factors, such as, production of new vehicles in the preceding year, vehicles scrapped during the preceding year, vehicle life and also the number of vehicles at the beginning of the previous year, are taken into account.

Any change in the production programme of vehicles would thus disturb the estimated requirement of tyres in the following years.

The actual production of various categories of vehicles during 1977-78 and 1978-79 is given below:

| Category of vehicles | Production during 1977-78 | Production during 1978-79 |
|---|---|---|
| Commercial Vehicles | 41244 | 60000 |
| Jeeps | 9114 | 10000 |
| Cars | 34422 | 40000 |
| Motor Cycles | 68245 | 82000 |
| Scooters | 165320 | 225000 |
| 3 Wheelers | 18555 | 19000 |
| Tractors | 40945 | 50000 |
| Total | 377845 | 486000 |

It would be seen that the production of tyres and tubes did not come up to the anticipated level. The main reason for the shortfall was the demand recession caused by the oil crisis which hit the road transport industry very badly. The production of vehicles did not increase at the anticipated level which resulted in lower demand and offtake of tyres.

The actual production of tyres and tubes for various categories of vehicles during 1970-79 is given below:

## PRODUCTION OF AUTOMOBILE TYRES & TUBES

| Year | Giant ('000s) | Motor Car ('000s) | Motor Cycle Scooter ('000s) | Tractor (Nos.) | Aero (Nos.) | A.D.V. (Nos.) | Off the Road (Nos.) | Total ('000s) |
|---|---|---|---|---|---|---|---|---|
| | | | | **T Y R E S** | | | | |
| 1970 | 2092.6 | 965.6 | 603.2 | 186466 | 7002 | 176386 | 9710 | 4041.0 |
| 1971 | 2363.8 | 1148.3 | 678.0 | 228679 | 13781 | 211727 | 14903 | 4660.0 |
| 1972 | 2391.8 | 1296.2 | 708.3 | 279810 | 16539 | 269379 | 16177 | 4978.2 |
| 1973 | 2487.1 | 1280.2 | 708.9 | 255853 | 12629 | 249930 | 18204 | 5043.0 |
| 1974 | 2713.2 | 1262.2 | 802.1 | 308682 | 9779 | 281141 | 17920 | 5395.0 |
| 1975 | 2879.9 | 950.0 | 1064.8 | 367001 | 11997 | 272984 | 17663 | 5564.3 |
| 1976 | 2724.3 | 913.1 | 1484.1 | 421833 | 14505 | 277192 | 18132 | 5853.1 |
| 1977 | 3069.2 | 998.8 | 1270.1 | 470022 | 16912 | 343487 | 13471 | 6182.0 |
| 1978 | 3410.6 | 1043.3 | 1505.5 | 425077 | 15948 | 425550 | 10037 | 7050.6 |
| 1979 | 3498.1 | 1057.3 | 1820.1 | 639215 | 12679 | 327538 | 12479 | 7090.6 |
| | | | | **T U B E S** | | | | |
| 1970 | 1706.7 | 1019.1 | 420.7 | 181236 | 968 | 190670 | 9551 | 3529.0 |
| 1971 | 2123.3 | 1303.4 | 608.1 | 220572 | 3919 | 239195 | 11233 | 4510.0 |
| 1972 | 2361.4 | 1265.7 | 623.7 | 255137 | 2723 | 255369 | 11820 | 4776.0 |
| 1973 | 2465.1 | 1168.1 | 588.1 | 257574 | 2754 | 227800 | 14151 | 4723.5 |
| 1974 | 2525.4 | 1099.0 | 606.8 | 243972 | 1703 | 223086 | 11455 | 4711.4 |
| 1975 | 2673.8 | 983.1 | 861.9 | 307641 | 3153 | 294623 | 8566 | 5138.0 |
| 1976 | 2276.1 | 1116.3 | 1211.2 | 396363 | 4786 | 359084 | 14750 | 5378.5 |
| 1977 | 2500.2 | 1069.6 | 1135.7 | 444423 | 3074 | 341049 | 11453 | 5425.0 |
| 1978 | 2972.5 | 1208.1 | 355.1 | 363959 | 3560 | 381038 | 7679 | 6090.5 |
| 1979 | - | - | - | - | - | - | - | 5697.7 |

The assumed replacement rate for tyres for each category of vehicle after accounting for retreading are taken as under:

| | | | |
|---|---|---|---|
| Buses and Trucks | 1.5 | tyres per | vehicle per annum |
| Jeeps | 1.5 | " | " |
| Cars | 1.10 | " | " |
| Scooters (2 wheelers) | 0.96 | " | " |
| Scooters (3 wheelers) | 1.8 | " | " |
| Tractors | 0.8 | " | " |
| Motor Cycles | 0.45 | " | " |

The replacement rate for bus and truck tyres is taken as five tyres per vehicle per annum on the assumption that 30% of the tyres required for replacement are retreaded. Earlier the retreded tyres for replacement were being taken as 25% of the requirement. Now, in view of the increased availability of nylon tyres and their longer life, the percentage of retreaded tyres has been increased from 25% to 30%. For a bus or a truck the gross requirement of tyres for replacement is seven per annum. After accounting for retreading of tyres to the extent of 30% of the requirement, the new tyre requirement works out to 4.9 tyres per vehicle per annum or say 5 tyres.

While projecting the demand pattern of different categories of tyres the following norms have been adopted:

| Category of vehicles | Rate of scrapping of vehicles | | Rate of consumption of tyres per vehicle per year for replacement |
|---|---|---|---|
| Trucks and Buses | 3% | | 5.00 |
| Light Trucks | 4% | | 2.75 |
| Jeeps | 4% | | 1.50 |
| Cars | 4% | | 1.10 |
| Motor Cycles | 4% | | 0.45 |
| Scooters | 5% | | 0.96 |
| Tractors | | Front | 0.8 |
| | | Rear | 0.6 |

TYRE REQUIREMENTS FOR DIFFERENT CATEGORIES OF VEHICLES UPTO 1987-88 (IN MILLION NUMBERS)

| | 1981-82 | 1982-83 | 1983-84 | 1984-85 | 1985-86 | 1986-87 | 1987-88 |
|---|---|---|---|---|---|---|---|
| Bus & Truck | 3.028 | 3.291 | 3.572 | 3.870 | 4.182 | 4.514 | 4.868 |
| Light Truck | 0.443 | 0.495 | 0.555 | 0.622 | 0.697 | 0.779 | 0.872 |
| Jeep | 0.241 | 0.261 | 0.284 | 0.308 | 0.331 | 0.360 | 0.392 |
| Passenger Car & Station Wagon | 1.044 | 1.075 | 1.111 | 1.144 | 1.184 | 1.225 | 1.269 |
| Tractor (Front) | 0.567 | 0.510 | 0.556 | 0.604 | 0.654 | 0.708 | 0.763 |
| Tractor (Rear) | 0.382 | 0.417 | 0.453 | 0.492 | 0.532 | 0.557 | 0.619 |
| Tractor (Trailer) | 0.102 | 0.108 | 0.114 | 0.120 | 0.126 | 0.132 | 0.138 |
| Motor Cycle | 0.557 | 0.669 | 0.690 | 0.767 | 0.859 | 0.947 | 1.081 |
| Scooter (2W) | 2.502 | 2.925 | 3.372 | 3.865 | 4.414 | 4.992 | 5.6 |
| Scooter (3W) | 0.252 | 0.285 | 0.324 | 0.365 | 0.414 | 0.461 | 0.556 |
| A.D.V. | 0.490 | 0.520 | 0.550 | 0.580 | 0.610 | 0.640 | 0.670 |
| A.T.R. | 0.007 | 0.007 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 |
| Aero | 0.018 | 0.019 | 0.020 | 0.021 | 0.022 | 0.023 | 0.024 |
| Defence Requirements | 0.094 | 0.097 | 0.100 | 0.103 | 0.106 | 0.109 | 0.112 |
| 10% Export Requirement | 0.962 | 1.062 | 1.170 | 1.285 | 1.412 | 1.545 | 1.687 |
| Total | 10.589 | 11.691 | 12.879 | 14.154 | 15.551 | 17.000 | 18.584 |

## Raw Materials

The main raw materials required for the manufacture of automobile tubes and tyres are natural rubber, synthetic rubber (SBR), polybutadiene, butyl rubber, synthetic latex, [illegible] me rubber, carbon black, rubber chemicals, sulphur, zinc oxide tyre yarn, cord, fabric (rayon and nylon), bead wires and tube valves.

The position regarding raw materials is given below:

| | Raw material | Requirement by 1982-83 (tonnes) | Requirement by 1987-88 (tonnes) | Total approved cap. (tonnes) | Gap by 1982-83 (tonnes) | Gap in 1987-88 (tonnes) |
|---|---|---|---|---|---|---|
| 1. | Raw Rubber including natural and synthetic rubber | 153330 | 229311 | Availability of natural rubber will match requirement but there is need to set up a unit for the manufacture of butyl rubber with a cap. of 20000 tPa | | |
| 2. | Reclaimed | 7667 | 114[illegible] | 38100 | Nil | |
| 3. | Carbon black | 53665 | 80259 | 105700 | Nil | |
| 4. | Tyre Fabric | 18169 | 27088 | 20800 | Nil | more cap. has to be licensed |
| 5. | Rubber | 3833 | 5733 | 22150 | Nil) | |
| 6. | Chemicals<br>Nylon yarn | 11356 | 16930 | 12000 | Nil | |
| 7. | Sulphur | 4600 | 6879 | Raw sulphur is being imported. There is adequate capacity for refining | | |
| 8. | Zinc Oxide | 6133 | 9172 | There is adequate capacity for conversion | | |
| 9. | Bead wire | 8479 | 12641 | Adequate capacity is available to meet the demand by 1982-83 | | |
| 0. | Tube valves | 20 million | 30 million | 10 million | 10 million | 10 million |

## Exports

The present level of export of tyres on the basis of the performance in 1977-78 is 350000 valued at about ₨ 200 million. A notification has been issued that the older units should export 15% of their production and newer units 10%. In view of the compulsory export obligation, it is expected that export of tyres may increase during the next five years.

## Research and Development

There was a proposal to set up a public sector unit for the production of 1 million tyres and tubes and also to establish an R & D unit attached to the production unit with a view to promoting R & D. However, this proposal seems to have been dropped.

At present there is no laboratory under the CSIR which is working on the R & D problems of the tyres and tubes industry. Some companies have their own R & D facilities.

## Conclusion

At present only conventional tyres are being manufactured in India; but in the West and other developed countries all steel radial tyres are fast replacing the conventional tyres. The all steel radial technology gives double the mileage, provides uncomparable road grip, additional drive comfort, and reduces the fuel consumption by 10%. It is suggested that in the interest of national economy and prestige, as well as to make the tyre industry sound in the export sector, the Government of India should encourage and help the import of the radial tyre technology. (KLR)

*Section IV*

# Current Technical Literature

Copies of articles/documents listed in this section are available on payment of Rs 5/- for the first 5 pages or part thereof and Re 1/- for every subsequent page of the photo-copy or xerox copy of the article/document. While placing the order, please mention the CTL number of the SENDOC Bulletin.

| Subject Index | CTL Nos. |
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# CURRENT TECHNICAL LITERATURE

## SCIENCE AND TECHNOLOGY

### Technology Transfer

401. NAWAZSHARIF, M & HAQ, K.M.A.: A time-level model of technology transfer. IEEE Transactions on Engineering Management, 1980, EM-27(2), 49-58.

A dynamic and spatial model of technology transfer has been presented, in relatively simple mathematical form, which incorporates time and potential technological distance as a level parameter. The existing models of technological change at a particular location (that is, the technological substitution models) are shown to be special cases of the developed time-level model. Transfer of computer technology has been used as an illustrative example. Analysis of the model results indicate that the developed time-level model of technology transfer can be used as a guide in determining the optimal partners for most effective technology transfer.

402. RAO, H.S.: On the technology of technology transfer. Invention Intelligence, 1981, 16(3), 113-123.

Technology transfer from R & D institutions to industry involves a highly complicated operation. There are many factors-status of the technology, capability of the entrepreneur, markets, fluctuating prices, imports, availability of raw materials, etc. which influence the successful establishment of commercial production. However, by studying cases of successes and failures in technology transfer, some broad conclusions could be drawn as to the factors that go to make a technology transfer operation a success or a failure.

RESOURCES

## Energy Sources

403. ----: Low cost biogas plant. Science for Villages, 1980, (38), 6-7.

The construction details of a low cost apparatus, devised by an entrepreneur in Nagpur, Maharashtra, are given.

404. HARIGOPAL, U. & TONAPI, K.V.: Technology for villages - solar drier. Indian Food Packer, 1980, 34(2), 48-49.

Discusses the features of a solar drier, developed by the Directorate of Fruit Processing and Preservation Industry, Khadi & Village Industries Commission for drying grapes, nungoo candy and onion. (BS)

405. NAHAR, N.M.: Flat-plate collector - A solar energy device, for rural applications. Urja, 1980, 8(6), 279-285.

Solar energy can be more efficiently trapped by use of flat-plate collectors with optimised configuration. Brief introduction of flat plate collector is given and collection efficiency and overall heat loss coefficient has been worked out. The applications of flat-plate collector for efficient harnessing of solar energy for rural development viz., solar water heating, crop drying, solar refrigeration for preservation of food, solar engines etc., have been discussed. (AA)

406. NANDA, S.K. et al: Design and performance of a seasonally adjusted solar concentrator. Regional Journal of Energy Heat and Mass Transfer, 1980, 2(1), 75-82.

A concentrating collector has been designed and fabricated to develop an inexpensive, non-tracking collector having a reasonable efficiency at temperatures of 100°C above the ambient. Problems of materials and construction, the optical efficiency and the heat losses are analysed in detail. The concentrator is made of commercially available glass mirror strips with a thermally isolated absorber. Its optical and thermal performance has been studied by experiments performed over a large number of days. The heat loss factor is obtained as a function of operating temperature. (AA)

## Waste Utilization

407. BASU, S.B. et al: Conversion of farm waste to oil. Science & Culture, 1979, 45(6), 219-223.

With a view to proper utilization of organic waste in the current energy crisis, various ways and means are being explored. The current study deals with one such possible means of converting the farm waste to synthetic liquid fuels whose resource position in the country is not sound. On a moisture and ash-free basis, paddy husk can yield 50.55 per cent of oil.

408. MAHANTA, D. et al: Rice husk composite board. Indian Pulp & Paper, 1980, 35(1), 9-17.

Discusses the utilization of rice husk for the manufacture of rice husk particle board together with its properties and manufacture. (BS)

409. SREEKANTIAH, K.R. et al: Studies on the extraction of pectinases from mouldy bran. Indian Food Packer, 1980, 34(2), 17-21.

Gives the materials and methods and experimental results for the extraction of pectinases from mouldy bran.

410. VASUDEVA, N̄.: Hard Board from coffee waste. Indian Coffee, 1981, 45(2), 29-30.

## AGRO INDUSTRIES

411. NARASIMHA CHAR, B.L. et al: Pilot plant studies on processing of groundnuts-IX drying and milling of high moisture groundnuts. The Oils and Oilseeds Journal, 1980, 32(4), 19-22.

A low cost, hand-operated rotary-dryer is described for accelerated drying of freshly harvested ground-nut-pods with 25 per cent moisture content. Groundnut kernels with moisture levels of 7 to 18 per cent are milled with proper control of variables and their parameters obtaining normal yields of oil under conventional oil mill conditions.

412. PILLAIYAR, P.: Problems facing rice bran oil extraction in India. The Oils & Oilseeds Journal, 1980, 32(4), 16-18.

The present production of rice bran oil in India accounts for only about 13% of the potential. As against a processing capacity of 15.5 lakh tonnes of ricebran, the solvent extraction plants numbering about 100 engaged in extracting rice bran oil could work only to about 30% of their capacities. This is mainly because of the non-availability of sufficient quantity of quality rice bran. By adopting the improved milling technologies, sufficient quantity of quality bran can be made available to all the solvent extraction plants. For reducing the silica and crude fibre contents in the deoiled meal, the rice mills should be fitted with proper precleaners and paddy separators. By installing suitable stabilizers either at the site of the production of bran or in a centralised place for a cluster of rice mills, the bran can be stabilized for producing low FFA rice bran oil. The problems experienced in pelletizing parboiled rice bran and refining of rice bran oil have been solved.

413. RAMASWAMY, K.G. et al: Refining of rice bran oil. Journal of the Oil Technologists' Association of India, 1980, 12(1), 16-19.

Conditions have been standardised on a laboratory scale for clarification, degumming, alkali refining, bleaching, dewaxing and deodorisation of crude rice-bran oil of FFA 4.2%.

Refined oil obtained in 80% yield was light and bland. The characteristics were comparable to Indian and Japanese standards for edible grade oil.

414. SCOTT, J.: An analysis of sunflower processing techniques. Oil Mill Gazetteer, 1980, 85(6), 10 & 13-15.

Discusses in detail the processing techniques of sunflower seeds.

415. SULLIVAN, F.E.: Sunflower oil processing from crude to salad oil. Journal of the American Oil Chemists Society, 1980, 57(11), 845A-847A.

World-wide use of sunflower oil is second only to soybean oil. Interest in domestic use as a premium salad oil is very recent. The high ratio of polyunsaturated-to-saturated fatty acids makes sunflower oil a premium salad oil. Sunflower oil, however, contains a small amount of high melting wax which must be removed to avoid settling problems. It is possible to produce a brilliant, dewaxed, deodourized sunflower oil with over a 100-hr. cold test at 0°C. This quality oil can be produced by conventional caustic refining, dewaxing, bleaching and deodourization. A quality finished oil may also be produced by dewaxing and steam refining. This paper reviews various methods for processing sunflower oil from the crude state through the finished, dewaxed, deodourized salad oil. (AA)

## FOOD AND ALLIED INDUSTRIES

416. ----: Food processing industry - Evaporation plant. Food Processing Industry, 1981, 50(591), 25-29.

A description of processes illustrating the latest developments in plant design.

417. ALIVAREZE, P. l et al: Extraction of tallow from meat meals: l. Assays in bench scale. Journal of the American Oil Chemists' Society, 1980, 57(6), 178-182.

A laboratory study on solvent extraction of tallow from meat meals is described for both stirred batch system and a flooded percolation system. The stirred batch system data, interpreted by standard diffusion concepts, show that the extraction process proceeds through a somewhat complex mechanism, which involves at least two types of extractable fat. The results for the percolation system which show the effect of different operating variables indicate that good yields are possible with a substantially low solvent requirement.

418. BURGESS, J.: The whys and wherefores of whey utilisation. Packaging & Processing, 1981, 3(3) 22-23, 27, 31, 41.

Efficient by-product utilization is essential to minimise the cost of primary dairy products i.e., cheese and butter.

Recent technological advances in treating cheese whey, the dairy industry's most important by-product, are described.

419 COULSON, J.: Food colours - A balanced view. Food Flavourings, Ingredients Packaging & Processing, 1981, 3(2), 14-17, 23.

Considers the colour requirements of various foodstuffs and how food colours available today fulfil these needs. Reviews current food colour legislation and looks ahead to some likely future developments in colour systems. (JBS)

420. KAPOOR, C.M. & GUPTA, S.K.: Soy-whey weaning food. I. Method of manufacture. Journal of Food Science and Technology, 1981, 18(2), 55-58.

A low-cost, protein-energy-rich weaning food of acceptable quality was prepared using soybean and cheese whey. The manufacturing method consisted in soaking, blanching and dehulling soy-beans, grinding the soy-whey mixture, adding oil and oil-soluble vitamins, homogenizing the mix, spray drying, fortifying, with water-soluble vitamins, flavouring, and packaging. The product was free from anti-trypsin activity. A flow sheet for the manufacture of soy-whey weaning food is presented.

421. **SHANKARACHARYA, N.B et al:** Clouding agents for soft drinks. Indian Food Packer, 1980, 34(2), 39-47.

Cloudy appearance is an important property of soft drinks since it gives the natural appeal of fruit juice. This is achieved by using clouding agents (cloudifiers) which also help in uniform distribution of the flavours throughout the liquid beverage. General methods for preparing clouding agents, their properties and patented process for them are discussed. (BS)

422. **SHARMA, R.S.:** Ghee: A resume of recent researches. Journal of Food Science and Technology, 1981, 18(2), 70-77.

The various aspects covered in the review are: chemical composition of ghee including saponifiable and unsaponifiable constituents; flavour components physico-chemical properties; thermal oxidation effect on saponifiable and unsaponifiable constituents, physico-chemical constants and carbonyl compounds and flavour; keeping quality of ghee influenced by feeding, season, method of preparation and packaging material, moisture, trace elements, amino acids, phospholipids, synthetic antoxidants, betel and curry leaves; improvements made in analytical/test methods; advances made in ghee making techniques and the future line of work needed. (AA)

## CHEMICAL INDUSTRIES

423. ----: Table salt. Colour and Chemicals Weekly, 1981, 7(8), 43.

Gives a profile on table salt with flow diagram, process involved, raw materials, etc. for an optimum plant capacity of 500 kg/day. (CV)

424. **CHOPRA, H.:** Chemical directory. Chemical Take-off, 1980, Annual Number, 9(10), 47-78.

An alphabetical list of chemical manufacturers along with their addresses and products is given. (MSR)

425. KAKKAR, V.K.: Preparing distilled water from an autoclave. Invention Intelligence, 1981, 16(3), 127-128.

An autoclave has been successfully employed for efficient and simultaneous preparation of distilled water for laboratory use. (AA)

426. KAVADIA, P.M.: Present status, future projection with likely problems and their suggestions in the field of sugar, alcohol and by-products. Chemical Engineering World, 1981, 16(3), 160-170.

427. LAL, S.: Changing technology of sulphuric acid plants. Chemical Engineering World, 1981, 16(1), 53-58 & 82.

Gives the capacity and demand projections for the years 1982-83, 1983-84 and 1987-1988. Discusses the consumption of raw materials and utilities in conventional plants and in Double Catalysis Double Absorption process. (BS)

428. PARGAL, H.K.: Design & fabrication of chemical plant and equipment. Chemical Engineering World, 1981, 16(3), 85-88.

Reviews the developments in design & fabrication of chemical plant and equipment, giving details of growth in indigenous capabilities and progress in execution of oil refineries. (BS)

429.. REVATHI; Chemical industry in 1979-80: A review. The Chemical Times, 1980, 7(36),8-9.

A brief review of chemical industry has been given. Status of major inorganic and organic chemicals & pesticides has been presented in tabular form. (MSR)

430. TRIVEDI, H.M.: 150 T. stearate of zinc, magnesium and aluminium. Colour and Chemicals Weekly, 1981, 7(8), 29-31.

Provides product profile on Aluminium Stearate, Magnesium Stearate and Zinc Stearate for a plant capacity of 150 tonnes per year at the rate of 500 kg per day for 300 working days in a year.(CV)

## SURFACE COATINGS

431. ----: Production equipment guide. Modern Paints & Coatings, 1980, 70(5), 37-50.

Designed as a buying and reference tool for coatings production executives. Provides information on machinery specifications, manufacturers, etc., according to ten categories of production and packaging equipment.

432. ----: Speciality paints. Paintindia, 1979-80, Annual, 20-22b.

The developments, advantages and disadvantages and the applications of speciality paints are briefly discussed. (KSDR)

433. BALACHANDRA, J.: Powder coatings in metal finishing: A review. Journal of the Electrochemical Society of India, 1980, 29(1), 6-10.

Gives the general properties of powder coating materials, the methods of application and their relative merits in different types of industries. (KSDR)

434. BANERJI, A.K.: A review on bituminous emulsions and their role as a protective coating. Paintindia, 1980, 30(1), 22-26.

435. CHARI, S.A.: Surface coating industry: Review of recent developments. Paintindia, 1979-80, Annual, 3-6.

Presents a review on powder coatings, water-based paints, high solids systems, radiation curable coatings, antifouling marine coatings, and flame retardent coatings. (KSDR)

436. GHOSH, S.: Parameters of evaluation of surface coatings: Utilisation of Indian standard methods of test. Paintindia, 1979-80, Annual, 33-36.

437. KHANNA, A.S.: Paint industry's problems. The Chemical Times, 1981, 8(6), Special Supplement, 9,10.

Explains the problems faced by the paint industry and the efforts made by the Indian Paints Association to solve these problems. (MSR)

438. NARAYANA, A. & SRINIVASAMURTHY, S.: Organic protective coatings: A review. Journal of the Electrochemical Society of India, 1980, 29(1), 1-5.

Various types of organic coatings, their properties and applications have been briefly discussed.

RUBBER

439. ----: Natural rubber in India: short-fall in production. Popular Plastics & Rubber, 1980, 25(8), 35-37.

Gives the statistical data on natural rubber production, consumption, exports, imports, during 1965-1979. (KSDR)

440. ----: Synthetic rubber. Popular Plastics & Rubber, 1980, 25(8), 37-38.

Gives the production, consumption, exports, imports of synthetic rubber during 1965-79. (KSDR)

441. BERGER, D.M.: Chlorinated-rubber-coatings. Modern Paint and Coatings, 1980, 70(6), 42-46.

Gives the flow chart for chlorinated rubber manufacture. Indicates the plasticizers compatible with chlorinated rubber and highlights some of the formulation tips. (KSDR)

442. PHILIP, K.M.: Rubber goods production in India. Rubber Board Bulletin, 1980, 16(2), 35-37.

443. RAI, J.S.P et al: Evaluation of rice-hull and bagasse ash as reinforcing filler for rubbers. Popular Plastics & Rubber, 1981, 26(3), 3-5.

## LEATHER INDUSTRY

444. ----: Indian footwear industry - A glance. Indian Footwear, 1981, 5(1), 47.

Reviews the status of the footwear industry in terms of production, imports, exports and future scope.(BS)

445. ----: Leather industry: present conditions & future prospects. Leathers, 1981, 22(2&3), 7-11.

Reviews the production and exports of different types of leather during 1978-79 to 1980 and enumerates the constraints on the industry. (BS)

446. KHANNA, J.K et al: Crust leathers for making tie and dye leathers, Screen and block printed leathers and photoscreen leathers. Leather Science, 1980, 27(7), 229-230.

447. KOTASEK, Z.: Challenges of Indian tanning industries. Leather Markets, 1981, 10(7), 35-37, 39-43.

Reviews the production and consumption trends of finished leather and enumerates the challenges that the tanners have to face. (BS)

448. LODH, N.R.: Standardisation and footwear industry. Lexport Bulletin, 1980, 3(5), 12-26.

Discusses the aspects that may be standardised, advantages of standardisation and the components that could be standardised and how it could be brought out. Highlights the role of Indian Standards Institution in the field of leather and leather products industry and the standards brought out by it. (BS)

449. SANTAPPA, M.: The Indian leather industry a syndrome. Lexport Bulletin, 1981, 3(7), 76-86.

Reviews the status of leather industry in terms of exports, raw materials, technology, manpower, leather chemicals & auxiliaries, machinery, by-products and effluent disposal. (BS)

450. SELVARANGAN, R.: Science and technology of leather manufacture: degreasing. Leather Markets, 1981, 10(9) 29-32.

451. SRINIVASAN, K.S.V. et al: Acrylic emulsions and their application in leather industry - a review. Leather Science, 1980, 27(7), 214-222.

Describes general method of preparation of acrylic emulsions and some of the important properties which acrylic polymers should possess for impregnation, base Vat and top coat application in leather processing. (BS)

## ELECTRONICS INDUSTRIES

452. ----: Growth of electronics - A national perspective. Science & Culture, 1979, 45(4), 129-133.

453. ----: Product focus displays. Electronic Engineering, 1980, 52(640), 85, 88, 93, 95, 97, 99.

Briefly covers various displays, namely computer graphic displays, light emitting diodes, liquid crystal displays, electromagnetic displays, self scan panels, fluorescent displays with necessary circuit diagrams. (VVR)

454. ----: Statistics. Electronics Information & Planning, 1980, 7(9), 627-631.

Gives the name & address of the party, item and annual capacity approved for minicomputer/micro processor based systems and allied items in the small scale and organised sector in a tabular form. Also gives the parties approved for the manufacture of mini/microcomputer, peripherals, etc. (VVR)

455. MAYO, J.S.: The power of micro electronics. Technology Review, 1981, 83(3), 46-53.

Miniaturization has opened up new fields in science and technology and has made significant contributions to fields such as computer science, data processing and communications. The "very large scale integrated" (VLSI) circuits have put new tools into the hands of researchers, cut the cost of computing, ting, stimulated the design of distributed software systems and have led to the expansion of "stored-program control" in nationwide telecommunications network. (JBS)

456. MUNFORD, R.: Throwing some light on modern display technology. Electrotechnology, 1980, 8(2), 46-48.

Briefly explains the current development in solid-state display technology. (VVR)

457. RAMAMURTI, T.V.: Raw materials for electronic components industry. Electronics For You, 1979, 21(2), 47, 49, 51.

Gives the essential components which are used in large numbers in electronic equipment i.e., resistors and capacitors of different kinds. Discusses the manufacturing difficulties and processes and utilisation of the raw materials in the industry. (BSR)

458. WILKINSON, R.: Contamination problems peculiar to the electronics industry. Electrotechnology, 1980, 8(2), 49-52.

With the continuing trend towards smaller and smaller dimensions in microelectronics circuitry, the problems of contamination during the manufacturing and processing stages become increasingly critical. In this article, the author defines the types of problems caused by subvisual contamination in device fabrication, and shows how filtration problems can be overcome by installing the correct equipment in the right place and at the right time. (AA)

*Section V*

# SENDOC Services

Featured in this section are technical enquiries received and the services rendered by SENDOC during the month of July, 1981. The charges for short technical enquiries will be Rs 5/- to Rs 10/ per typed page and the charge for each readymade industry profile available with SENDOC is Rs 10/-.

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|---|---|---|
| 1. | EI - Tamil Nadu | A Select Bibliography on Executive Effectiveness |
| 2. | Ent. - Andhra Pradesh | Profiles on: Sodium Silicate, PVC Pipes & Fittings, Paper Board Cartons, Silica Gel, Compression Moulded Plastic Goods, Reclaimed Rubber, Spheroida Graphite, Iron Foundry, Wood Seasoning Furniture, Flush Doors, Panel Doors & Windows, Steel Wire Drawing, Wire Woun Resistors, Banana Powder, Heating Elements & Heaters, Steel Almirahs/Wardrobes & Steel Racks, PVC Cables, Salt Glazed Stoneware Pipes & Fittings, Stoneware Pipes, Agro-Industrial Waste without Binder, Camphor, Sodium Thio-Sulphate and Roller Flour Mill. |
| 3. | Ent. - Arunachal Pradesh | Profiles on: Bolts & Nuts, Hot Dip Galvanising of Miscellaneous Articles, Jobbing Workshop for Agricultural Implements, Production of Garment Leather, Steel Almirahs/Wardrobes and Steel Racks. |
| 4. | Ent. - Bihar | Profiles on: Welding Electrodes, Jute Sutali , Rubber Vee & Auto Fan Belts. |
| 5. | Ent. - Gujarat | Profile on Steel Furniture. |
| 6. | Ent. - Himachal Pradesh | Profile on Saponin from Soapnuts. |
| 7. | Ent. - Karnataka | Profile on Rava from Tapioca. |

| Sl. No. | Enquirer | Service Rendered |
|---|---|---|
| 8. | Ent. - Maharashtra | Profiles on: Cinema Arc Carbon Rods, Agro Industrial Waste, Plastic Bobbins for Textiles, Asbestos Cement Pipe, Galvanised Iron Buckets, Paper Bags, Milk Pouch Plant, PVC Leather Cloth, Audiomagnetic Tape. |
| 9. | Ent. - Orissa | Profiles on: Saw Dust Briquettes, Paper Cups & Saucers. |
| 10. | Ent. - Uttar Pradesh | Profiles on: Wire Drawing, Protein Isolate from Soya Bean, Polypropylene Woven Sack. |
| 11. | GD - Andhra Pradesh | Profiles on: Brass Cock and Absolute Alcohol from Molasses. |
| 12. | GD - Nepal | Technical Note on Printing Ink. |
| 13. | SI - Andhra Pradesh | Profiles on: Carbon Black from Assam Coal, Maize Starch, Liquid Glucose from Maize Starch, Dextrine, Re-rolling Mill for Steel Billets & Steel Scraps, Glass Bottles, Card Board from Waste Paper, Printing Ink, Cold Sto Gummed Paper Tape, Card Board from Bagasse, Furfural from Agro Industries Wastes, Conveyor/Transmission Belting, Chrome Pigments, Citric Acid, Lozenges & Lemon Drops. |
| 14. | SI - Bihar | Profile on: Auto Lamps, Carbon Paper. |
| 15. | SI - Karnataka | Technical Note on China Clay. |
| 16. | SI - Madhya Pradesh | Profiles on: Polyester Sheet, Ferrous & Non-Ferrous Foundry, Aluminium Hardw |
| 17. | SI - Maharashtra | Profiles on: Straw Board, Grey Board, Double Boiled Linseed Oil and Banana Powder. |
| 18. | SI - Orissa | Profile on Alcohol from Mahua Flowers. |
| 19. | SI - Tamil Nadu | Profile on Speciality Paper. |

Note: EI - Educational Institution, Ent. - Entrepreneur
SI - Small Industry, GD - Government Department.

## Rolled Plastic Gears

Plastic gears are usually made by tooth cutting or injection moulding, as it is believed that rolling plastic gears is a difficult process. The Research and Development Corporation of Japan (JRDC) is now offering on license a process to roll plastic gears which is claimed to have several advantages over the usual methods.

The main problems in rolling plastic are due to the fact that plastic has a great tendency to 'spring back' as a solid (thus creating problems in cold rolling) and that it cannot be heated by high frequency methods (causing problems in hot rolling).

The JRDC process involves the melting of gear teeth of the gear blank by bringing the plastic material in contact with a heat source just above the melting point of the plastic. The plastic is then hot-rolled to the approximate shape required. It is then cooled and brought in touch with a source heated to just below the melting point of the plastic and the gear teeth are shaped accurately. The material is then finish rolled cold.

The entire process is said to be more compact, simpler in structure and less expensive, as a rolling machine costs less than injection moulding equipment or gear cutting equipment. The heat source is a nichrome wire which costs just 1% of a high frequency heating source. It is claimed that the precision of the finished product is better than that obtained by cutting or piece-by-piece injection moulding.

Further details may be obtained from: JRDC, 5-2, Nagata-Cho, 2-Chome, Chiyode-ku, Tokyo 100, Japan.

## Transformer Oil

Mineral insulating oils are extensively used in transformers and to some extent, in switchgear and reactors to serve as a dielectric and a cooling medium. The transformer oil being a speciality product was imported completely till 1969 when the indigenous production started. At present, there are about a dozen private companies both in the major and small-scale sectors who purchase the low-viscosity index (LVI) base-stock from the two public sector refineries (Madras Refineries, Ltd. Madras and Hindustan Petroleum Corporation, Bombay), and subject it to the conventional treatment for producing the transformer oil.

The electricity supply utilities and electrical manufacturing industries have reported that all the indigenous transformer oils are of poor quality since they rapidly deteriorate losing the insulation properties when in service or in storage, whereas the imported transformer oils are far superior inasmuch as they are stable and have a considerably longer life. Complaints received related to non-attainment of insulation resistance after filling, frequent replacement due to ageing, transofrmer failures and delays in commissioning of major transformers. So much so, imported transformer oils are preferred to indigenous products.

Recognizing the need for systematic investigations, the Central Power Research Institute (CPRI), Bangalore, organized a workshop in 1976 on transformer oil wherein representatives from electricity supply utilities, electrical manufacturing industries and transformer oil producers participated. It was emphasised in this meeting that a detailed evaluation of the available base-stocks would be necessary to improve the quality and characteristics of the indigenous transformer oil.

CPRI undertook this R & D work. Extensive laboratory investigations were carried out on several samples of imported and indigenous transformer oils as also of existing base-stocks marketed by the two refineries. A small plant was also rigged up in CPRI for production of transformer oil on a laboratory scale. This led to the conclusion that the transofrmer oils should have an appropriate mix of aromatics, napthenics and paraffinics including sulphur content for the desired characteristics to be achieved. It was also found that the refineries would have to adopt a new process in the extraction of the special basestock from the crude for production of superior quality transformer oil.

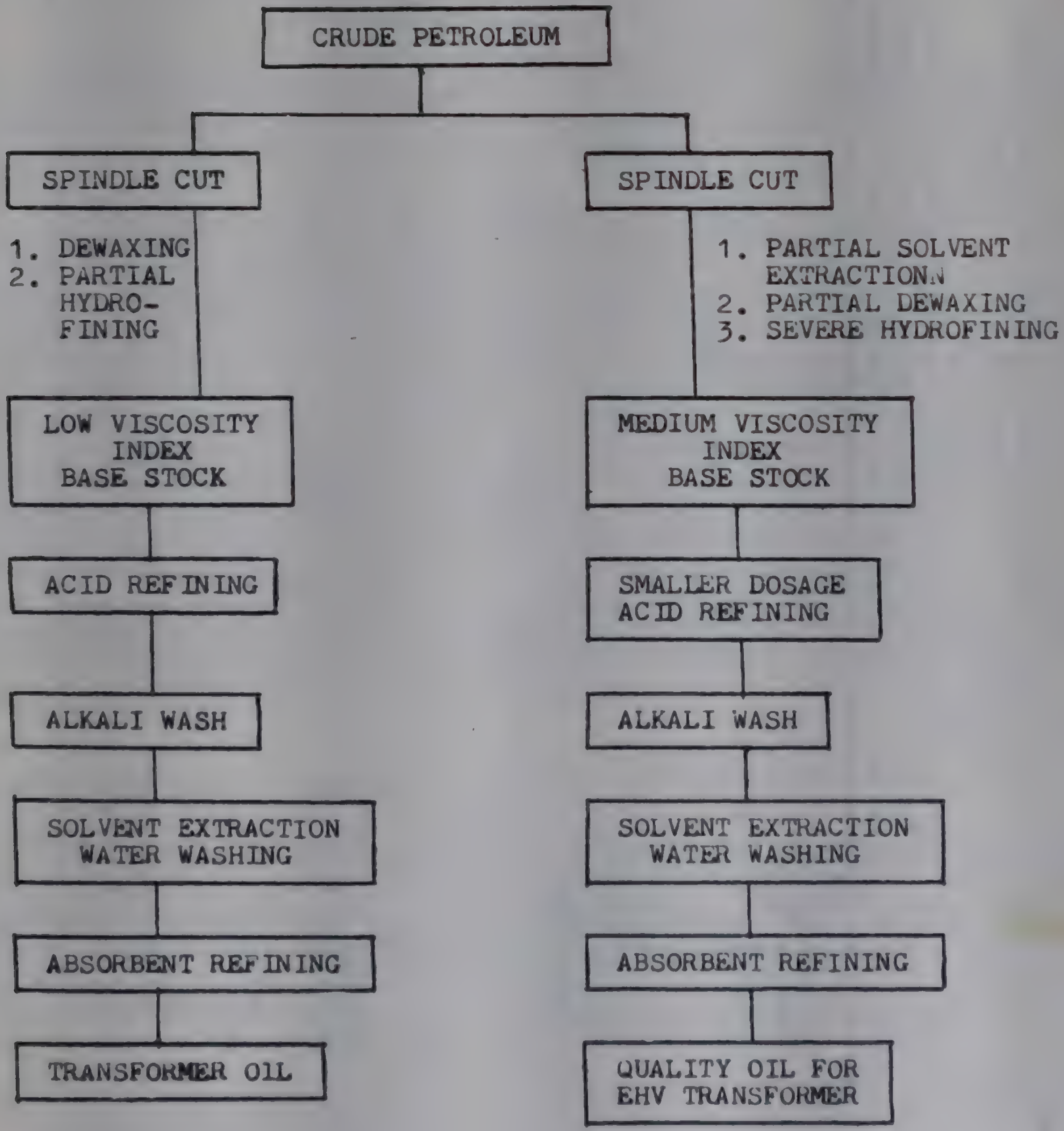
CPRI then closely associated in its R & D work with Madras Refineries Ltd., as it had the necessary infrastructure for solvent extraction, dewaxing as also hydrofining. After several permutations and combinations, CPRI was able to hit upon the process for obtaining a special high yielding medium viscosity index base-stock (from the Iranian Crude) having the required composition and characteristics for the production of the high quality indigenous transformer oil. This involved partial solvent extraction, partial dewaxing followed by severe hydrofining of the spindle cut from the crude petroleum. Fig. 1 is a flow diagram illustrating the new process. Transformer oil produced on laboratory scale from this special base-stock was found to possess excellent characteristics comparable with imported products as brought out in the tabular statement (Fig. 2).

These encouraging results have led to the commercial production by MRL of a trial batch of the special base-stock. Madras Petrochem has taken up the production of the transformer oil from this special base-stock. After testing and certification by CPRI, this oil would be tried in EHV transformers by Electricity Boards and major transformer manufacturers in the country for monitoring its performance under service conditions. This work is a major break-through in indigenous technology as it would not only eliminate the need to import transformer oil but also improve the reliability of transformers in service.

This Research and Development study took nearly three years for completion and was carried out successfully in the Chemistry Division of the Institute.

FLOW DIAGRAM FOR MANUFACTURE OF INDIGENOUS TRANSFORMER OIL

1. Process Presently Adopted    2. New Process Developed at C.P.R.I.


CRUDE PETROLEUM
SPINDLE CUT
SPINDLE CUT
1. DEWAXING
2. PARTIAL HYDRO-FINING
1. PARTIAL SOLVENT EXTRACTION
2. PARTIAL DEWAXING
3. SEVERE HYDROFINING
LOW VISCOSITY INDEX BASE STOCK
MEDIUM VISCOSITY INDEX BASE STOCK
ACID REFINING
SMALLER DOSAGE ACID REFINING
ALKALI WASH
ALKALI WASH
SOLVENT EXTRACTION WATER WASHING
SOLVENT EXTRACTION WATER WASHING
ABSORBENT REFINING
ABSORBENT REFINING
TRANSFORMER OIL
QUALITY OIL FOR EHV TRANSFORMER

## TEST RESULTS OF INDIGENOUS/IMPORTED OIL SAMPLES

| Tests | Present Commercial Oil | | Imported Paraffinic Oil | | Imported Napthenic Oil | | CPRI New Oil | | Permissible Limit | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Initial Values | After Ageing* | Initial Value | After Ageing* | Initial Value | After Ageing* | Initial Value | After Ageing* | Initial Value | After Ageing* |
| Resistivity Ohms cm x $10^{12}$ | | | | | | | | | | |
| at 27°C | 1760 | 0.64 | 550 | 3.1 | 1000 | 1.80 | 625 | 2.5 | 500 | 1 |
| at 90°C | 90 | 0.05 | 98 | 0.17 | 150 | 0.13 | 22 | 0.11 | 13 | 0.1 |
| Dielectric Dissipation Factor (Tandelta) | | | | | | | | | | |
| at 27°C | 0.00001 | 0.07 | 0.0002 | 0.01 | 0.00003 | 0.011 | 0.00004 | 0.01 | - | - |
| at 90°C | 0.001 | 0.7 | 0.002 | 0.121 | 0.0001 | 0.125 | 0.001 | 0.14 | 0.005 | 0.2 (Upper Limit) |
| 3. Acidity | 0.028 | 0.138 | 0.03 | 0.057 | 0.012 | 0.013 | 0.003 | 0.036 | - | - |
| 4. Sulphur content | 1.35 | - | 0.207 | - | 0.205 | - | 0.65 | - | - | - |
| 5. Indv. Analysis | | | | | | | | | | |
| $C_n$ | 30 | - | 42 | - | 54 | - | 40 | - | - | - |
| $C_A$ | 22 | - | 7 | - | 8 | - | 10 | - | - | - |
| $C_P$ | 48 | - | 51 | - | 38 | - | 50 | - | - | - |

* Values obtained after subjecting oil samples to ageing by ASTM open beaker method (ASTM D-923)

## Regeneration of Steel Materials from Steel Scrap

An economical process for the production of high quality steel by continuous melting and refinement of steel scrap obtained from waste materials has been developed by the Mitsubishi Heavy Industry of Japan. The process comprises the following steps:

1. Melting: A given amount of scrap is cut and put into a cupola type melting furnace together with coke and limestone. The scrap is melted continuously with heat generated through combustion of coke. A waste gas treatment device separates and disposes off the gases generated from impurities.

2. Refining: The molten metal is continuously fed into a refining furnace via a forehearth. In the refining furnace, the metal is combined with oxygen to remove impurities.

3. Regulating: After refinement, steel enters a regulating furnace where alloy components are added to modify the chemical composition to fit the planned characteristics of the metal and the temperature is adjusted for casting.

4. Casting: The regulated molten steel is fed into a continuous casting machine, where it is worked into billets. The melting, refining and regulating processes, which are usually carried out in a single electric furnace, are separated and connected together systematically, so that they are mutually and organically controllable. The new arrangement shortens the total time required for the production of billets to about 2 hr. The salient features of the process are as follows: (i) It reduces the usual energy costs by 20% and gives an additional saving of 20% from shorter working hours; (ii) the closed continuous-type melting and refining furnaces keep the generation of waste gas and powder dust at constant levels and use little specialized waste gas treatment equipment to process completely the exhaust gases; and (iii) the cupola-type melting furnace can charge and melt the scrap continuously and can handle all shapes of automobile scrap.

## Simple Fluid-jet Attenuator

Mr. JE Rapson of Hovercraft Development Ltd., has found that a tailpipe of conical profile fitted to the outlet of a pipe carrying a liquid or gas at high pressure can be made to attenuate the force of the emerging jet of fluid.

The attenuation effect is associated with the formation of intensively active vortices within the fluid in the conical section and therefore depends on the shape of the cone. For a liquid, the cone easily can be kept full of liquid by placing an obstruction such as a perforated grid across the mouth of the cone. The device works even when the jet is mounted horizontally or vertically downwards. If the cone is empty there is no attenuation. There is little difference in resistance to flow between the two modes, and thus it is possible to switch the jet on and off without restricting the rate of flow through the system.

The device could be used in a number of roles:

- to reduce the 'throw' of a fluid jet
- to reduce the reaction of the jet on the pipe
- to reduce the pressure of a piped fluid
- as a heat exchanger
- as a heat exchanger
- to mix fluids
- to separate gases from liquids.

While devices for achieving these effects already exist, Mr. Rapson's design is extremely simple, cheap, compact and has no moving parts. Although cones of various cross-sectional shapes have been used, the angle of the cone must be kept within defined limits if the desired effects are to be obtained.

The intensity, size and position ofthe vortices may be varied by altering the geometry of the cone, either at the design stage or by making the cone adjustable - a feature that can be used to advantage in mixing, separation and heat-exchange applications.

The conical attenuator could have numerous applications in a broad range of industries. One of the simplest is reducing the disturbance when filling a liquid storage tank containing sediment. At the other extreme, the principle could be applied to district water supply installation or be used to contain and collect the products of an oil-well blow-out.

Patent protection has been sought in the UK, Canada, France, West Germany, Japan, The Netherlands, Norway and the USA.

Companies interested in using or manufacturing devices based on this principle (UK Patent Application 21522/77) are invited to contact David Veasey, Mechanical & Civil Engineering Group, NRDC, Kingsgate House, 66-74 Victoria Street, London SW1E [illegible], to obtain further information and to discuss licensing arrangements. Financial support might be available for UK companies wishing to develop the more important applications.

### Textile Yarn Spinning Process

A new textile yarn spinning process has been developed by CSIRO, Repco Ltd., and the International Wool Secretariat. To be marketed worldwide under the name of Sirospun, it offers substantial cost reductions in yarn manufacture.

For wool, the total world market to which the process could be applied exceeds 1,00,000 tonnes per annum. Exports of wool, mostly for processing by the worsted method, currently earn Australia some $ 1700 million a year.

The process enables the spinning and twisting operations required to produce weaving yarns to be carried out in one stage. Equipment in current use needs only slight modification to accommodate it.

One of Sirospun's major benefits for wool processing is that it overcomes the disadvantage of the fibre's slower spinning speed compared with that of synthetic fibres. In Europe, the process has already helped in opening up new markets for fine wools.

Economic gains for the textile processor are very substantial. Early predictions put the savings in the costs of forming yarn at more than 60c per kg. out of a total cost of about $ 2 a kg. and the full-scale units already operating have proved these predictions to be conservative.

Originally conceived at the CSIRO Division of Textile Industry, Geelong, Vic., the process has been extensively tested in a number of Australian and European mills for 2 years. Over this period improvements to the earlier Sirospun version have been introduced, refining the process significantly. Some 22,000 spindles have been adapted to it and are now operating commercially.

For commercial information: Mr. G. Ditz, PBR Industrial Company, P.O. Box 15, South Oakleigh, Vic., 3167, Australia.

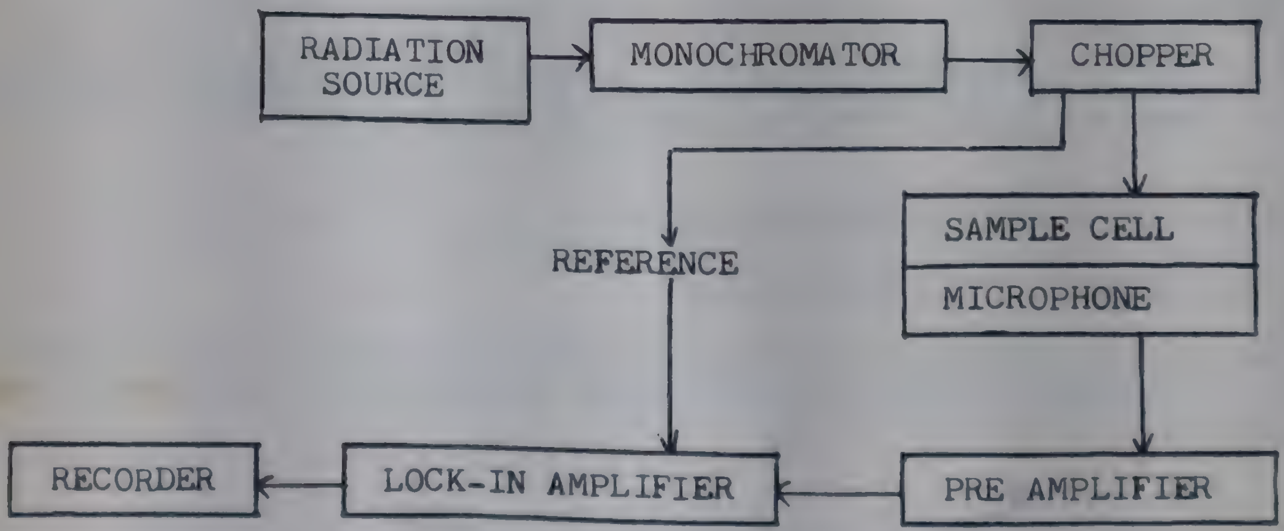
## INSTRUMENTS AND INSTRUMENTATION

### Photoacoustic Spectrophotometer

The National Physical Laboratory (NPL), New Delhi, has designed and developed a simple, single-beam photoacoustic spectrophotometer.

The principle of photoacoustic spectroscopy (PAS) is as follows: The sample whose absorption spectrum is to be determined is placed in a specially designed airtight cell equipped with a sensitive microphone. It is then exposed to intermittent (chopped) monochromatic light. If the sample absorbs at the wavelength of the incident light, the light energy is converted to heat energy and the temperature at the surface of the sample fluctuates at the chopping frequency of light. This temperature fluctuation, in turn, creates a pressure fluctuation in the air of the cell that is detected by the microphone and is converted to an electronic signal. By varying the wavelength of the incident light, it is possible to obtain the complete optical absorption spectrum of the sample.

The radiation from a 600 W tungsten-iodine lamp is focussed on the entrance slit of a monochromator with a condensing optics so chosen that it matches with the optics of the monochromator which has symmetrically variable entrance and exit slits. The monochromatic radiation from the exit slit is modulated by a variable frequency chopper, and through proper optics, it uniformly irradiates the sample (1 x 0.5 cm) placed in an acoustically sealed cylindrical type, small-volume, stainless-steel cell, which iswell machined and polished from inside. The cell with air as the coupling gas is attached to a condenser microphone along with a low-noise, high-sensitive preamplifier. The pre-amplified signal is processed by a narrow-band lock-in amplifier, which can be easily tuned to any frequency. This rectified signal is then recorded on a strip chart recorder. The spectrum thus obtained is normalized against the spectrum of carbon/carbon black, assuming it to be close to a black body absorber and obtained under experimental conditions similar to those of the sample. The normalized signal plotted against the wavelength is the photoacoustic spectrum. The block diagram of the photoacoustic spectrophotometer is shown in the figure.



The normalized photoacoustic spectra of CdSe, CdTe and $Nd_2O_3$ recorded with the spectrophotometer accord with those reported in the literature.

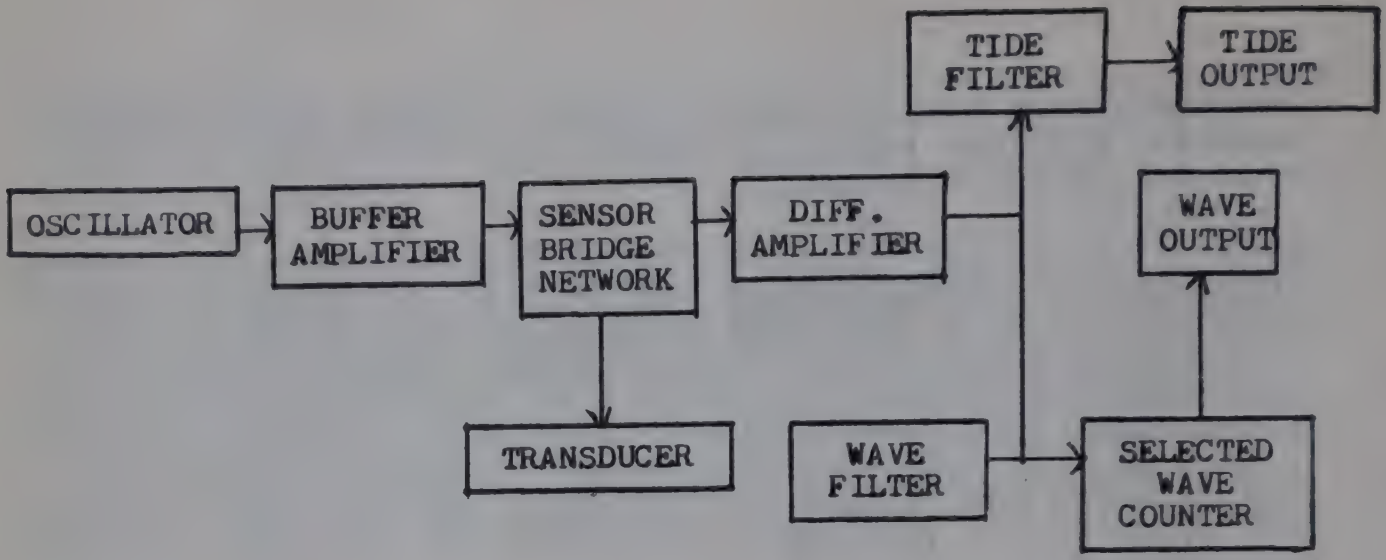
Because of its high detectivity and high sensitivity, the photoacoustic spectrophotometer can be used for obtaining absorption spectra of a very wide range of materials like powders, less highly reflecting surfaces, opaque samples, biological materials and medicines, organic and inorganic compounds, liquids, insulators, semiconductors, etc., whose spectra are otherwise difficult to obtain by conventional reflection or transmission spectroscopic techniques. An advantage of the PAS technique is that there is no need for any special sample preparation.

The photoacoustic spectrophotometer has potential application for non-destructive material characterization and is being use for bulk studies, surface studies, deexcitation studies, very low level detection of air pollutants, ppb level detection of liquid impurities, spectral measurements of very weak absorptions, and quick calibration and spectral distribution determination of radiation sources.

## Tide and Wave Telemeter

The instrument is used for monitoring tidal levels and waves along the coast or at deeper water by means of suitable structures for mounting the transducer. An existing pier or a submerged platform can be used for mounting transducer for measurements along the coast. The instrument can be used for ocean measurements with its transducer mounted on available structures there such as drilling rigs or so.

The instrument consists of a water level transducer and an electronic monitoring unit both being connected by a long 2-core cable. There are two types of transducers available for sensing water level, namely pressure transducer and electrical wave staff. The type of transducer is chosen according to the facilities available for mounting. The transducers produce electrical signals proportional to the water level. The signals from the transducers are very strong so that they can be conveyed to the electronic unit without any problem of noise interference. The electronic display unit displays the water level in a meter. These signals are further separated into their components namely tide and wave. All the information can be separately displayed in continuous recorders.


TIDE FILTER
TIDE OUTPUT
OSCILLATOR
BUFFER AMPLIFIER
SENSOR BRIDGE NETWORK
DIFF. AMPLIFIER
WAVE OUTPUT
TRANSDUCER
WAVE FILTER
SELECTED WAVE COUNTER

The National Institute of Oceanography, Goa, has designed and fabricated three prototypes and their performance has been found satisfactory. The specifications of the product are as follows:

Tidal range : 0 to 4 meters (higher ranges can also be provided)

Accuracy : ± 5 cm.

The device is fully solid-state and operates on nine volts dry cell with display on a microammeter. The device has also provision for feeding the signals to a continuous strip chart recorder.

The main raw materials required are stainless steel bellows, PVC tube, brass nuts, stainless steel bolts of special types, fibreglass resin, stainless steel tubes, instrument box and electrical and electronic items such as 2-core cable, metal film resistors, carbon film resistors, microammeter, transistors, zener diodes, transformers, switches, dry cells and battery box. All these items are available indigenously.

The main equipment required are a small lathe, electrical drill, grinder, PVC welding set & coil winding machine. All these equipment are available indigenously.

The main test instruments required are transistor tester, oscilloscope, FET voltmeter, multimeter. All these items are available indigenously.

## Techno-economics of the project

| | | |
|---|---|---|
| Suggested economic unit | : | 20 Nos./year |
| Fixed capital on building | : | ₨ 60,000/- |
| Fixed capital on plant | : | ₨ 60,000/- |
| Working capital | : | ₨ 30,000/- |
| Cost of production/unit | : | ₨ 4,600/- |

## MINERAL BASED INDUSTRIES

### Energy Conservation in Clinker Grinding Through Use of Grinding Aids

Energy conservation in industrial sector has assumed great importance all over the world. This is true with cement industry as well. It is estimated that nearly 130 kWh power is consumed for producing each tonne of cement by dry process and a few kWh less for the wet process. Nearly 80 per cent of it is consumed in crushing and grinding operations alone, but the energy that is gainfully utilized is very low. Even in comparatively big mills, out of every 100 kWh energy put in, only 0.6 to 0.8 kWh is used for theoretical comminution and the rest is wasted mainly in generation of heat. If by some means, the energy consumption can be lowered by even 2 kWh/tonne of cement it amounts to an annual saving of ₨ 12 million at the present level of production of cement. The performance and efficiency of grinding operations depend on factors, such as (i) proper choice of mill, (ii) design of diaphragm, (iii) proportioning of ball mill charge, (iv) proportioning of chamber length and (v) proper venting of mill circuit. Besides the above, improved grinding efficiency can also be achieved through use of grinding aids.

Grinding aids are chemical additives which when added in small quantities to the clinker in the grinding mill improve the efficiency of clinker grinding. Grinding aids are mostly organic surface active agents which get physically absorbed on the freshly formed clinker surfaces in the grinding mill thereby neutralizing the free valencies which are responsible for adhesion. Thus, the grinding aids reduce incrustation on grinding balls and lining plates, secondary grain formation of the finest grains and the adhesion of the finer particles on the coarser ones. Therefore, the pulverisation action of the clinker to be ground and the separation of sufficiently fine grains from the materials is facilitated. These factors lead to improving the overall grinding efficiency of clinker grinding.

The most frequently used grinding aids in cement industry in advanced countries are ethanol amines, glycols, organo-silicons, sulphate lye etc. However, their use in cement industry in India primarily depends on the techno-economics.

The Cement Research Institute of India (CRI) has carried out a detailed evaluation of the performance of various indigenous grinding aids in improving clinker grinding efficiency by monitoring the Blaine fineness of clinker ground to different time periods both in presence and absence of different amounts of grinding aids. The grinding aids studied were monom,di, and triethanolamines, mono and diethylene glycols, glycerol, sodium lauryl sulphate, cetyl trimethyl ammonium bromide, Superpol-EO--60(N) and BN(non-ionic surfactants), Swanic CM (non-ionic polyoxy ethylene ether type surfactant), coal, Celex (processed byproduct from paper industry) and sulphate lye (black liquor from paper industry). The study revealed that all the above grinding aids improved the clinker grinding efficiency particularly above 3000 $cm^2/g$ fineness (Blaine). The increase in fineness of clinker was as high as 30 per cent compared to the blank and the ball coating and coating on liners was also minimized in presence of grinding aids. The laboratory studies followed by selected pilot plant trials indicated a possible saving of upto 10 kWh/tonne of clinker for grinding to a fineness of about 3500 $cm^2/g$ and the savings increasing with increasing fineness. Based on techno-economic considerations, sulphate lye black liquor appeared to be a promising grinding aid for grinding clinkers in the range above 3300 $cm^2/g$.

Based on the laboratory findings, CRI has evaluated the performance of triethanolamine and sulphate lye as grinding aids in a regular commercial grinding mill in a 600 tpd cement plant. The grinding mill was a three compartment air-swept mill having a capacity of 35 tph at a fineness of about 3000 $cm^2/g$.

Different concentrations of the aqueous solutions of the grinding aids were prepared and added to the clinker as it left the feed table by means of a specially designed agreement. The arrangement consisted of an overhead tank filled with the grinding aid solution and kept at a height of about 4 meters above the clinker feed table, a perforated pipe and a hose pipe connecting the two. The perforated pipe was made of steel and had an internal diameter of 2.5 cm and was fixed over the feed table across the cross-section of the clinker in such a way that the liquid jets coming from the perforations fell on the clinker at a slight angle. The flow rate of the solution was controlled by two regulating valves, with one of them just before the delivery pipe and also by maintaining a constant level of the solution in the tank throughout the operation.

The benefits obtained during the plant trials are as under:

(i) Triethanolamine (0.03 to 0.06 percent by weight) of clinker added in the form of 20 per cent aqueous solution) increased the fineness of cement by 18.5 per cent at 2810 $cm^2/g$ and 23 per cent at 3325 $cm^2/g$. Alternatively, the mill output was increased by nearly 40 per cent at a constant fineness of 3325$cm^2/g$.

(ii) Sulphate lye (0.06 per cent by weight of clinker added in the form of 8 per cent aqueous solution) increased the fineness of cement by about 35 per cent at 3325 $cm^2/g$. Alternatively, this can lead to an increase in mill output by 35 per cent at 3325 $cm^2/g$.

(iii) The possible saving in power consumption by employing sulphate lye as grinding aid works out to about 3, 11 and 19 kWh/tonne at 3000, 3500 and 4000 $cm^2/g$ fineness respectively (See Table).

### TABLE

### Possible Saving in Power Consumption by Employing Sulphate Lye as Grinding Aid

| Fineness $cm^2/g$ | Possible Saving in Power Consumption kWh/t |
|---|---|
| 2900 | 1.36 |
| 3000 | 2.93 |
| 3100 | 4.48 |
| 3200 | 6.06 |
| 3300 | 7.65 |
| 3400 | 9.28 |
| 3500 | 10.88 |
| 3600 | 12.52 |
| 3700 | 14.17 |
| 3800 | 15.85 |
| 3900 | 17.51 |
| 4000 | 19.20 |

Investigations on the setting, hardening, strength development and air content of cements ground with and without grinding aids revealed that grinding aids used in such small concentrations have practically no effect on these physical characteristics of cements. Also the amount of the grinding aids employed (less than 0.1 percent) is such that the cements ground with grinding aids are very much well within the standard specifications.

Based on the techno-economic considerations sulphate lye black liquor from paper plants, which is rich in lignin sulphonates and is surface active and whose cost is less than a rupee per kilogram, appears to be a potential grinding aid for improving clinker grinding efficiency in Indian cement plants particularly when grinding cements to fineness of around 3300 $cm^2/g$. and above. The benefits obtained in terms of increasing output or increasing fineness are more or less at par with those derived from the well known triethanolamine and ethylene glycol, which are prohibitively costly in India.

As the mineralogical composition and the surface characteristics of clinker have an effect on the functioning of the grinding aids, it is essential to establish the optimum dosage and dilution of the grinding aid by a regular plant trial and employ the optimum dosages to derive maximum benefits.

Sulphate lye is the black liquor obtained during the cooking of wood with steam and other inorganic chemicals in the paper industry. The black liquor generally consists of 10-15 per cent of solids of which about 50 per cent is organic and the rest inorganic matter. The organic portion is made up of 10-15 per cent wood sugars, 40-50 per cent lignin derivatives and about 20 per cent tannin matter. The organic portion, particularly the lignin derivatives, is considered responsible for the grinding aid action of sulphate lye. Many paper plants recover the inorganic salts from the black liquor, followed by burning off the organic portion to get the heat value. Some plants have agreed to supply part of the black liquor to the cement plants nearby on regular basis. CRI extends any assistance to those cement plants who wish to employ grinding aids in their regular production.

## Energy-Saving Semi-Wet Process Cement Plant

The new £30 million cement manufacturing plant at the Rochester (Kent) Works of Rugby Portland Cement Co., Ltd., UK, designed to produce 765,000 tonnes of cement a year, is now in full production using an energy saving semi-wet process.

The plant uses one large rotary kilns in place of three small, energy-intensive kilms which had been in constant operation for 30 years. It doubles the capacity of the works and yet consumes only 20 per cent more energy.

Dominating the works is the new 725,000 tonnes a year rotary kiln with its Lepol preheater grate. The grate is the second largest of its type in the world. Associated with the kiln and providing the bulk of the savings in energy consumption is the filter press equipment, where up to 70 per cent of the moisture in the raw material slurries is moved mechanically. Previously, using the 'wet' process, moisture was boiled off and energy costs were consequently high.

The decision to build a new kiln at Rochester followed an upsurge in demand for cement in South-East England. Following the 1973 oil crisis, the 'semi-wet' process was chosen as the energy-saving process most suited to the sticky raw materials at Rochester.

Rugby Portland Cement are the second largest cement manufacturer in the United Kingdom supplying some 16 per cent of the home market.

## Reaction Bonded Silicon Nitride

Reaction bonded silicon nitride is a new high temperature refractory material. It is known to be produced in Europe and USA only from late 1960 onwards. The material is characterized by its remarkable strength at high temperatures, exceptional resistance to thermal shock and corrosion. It finds wide application in non-ferrous metallurgical industries, in foundaries, as thermocouple sheaths, as seats and plugs for top holes for molten metals, as support in metal toughening industries, etc.

The product is new to the Indian market. However, enquiries from prospective users indicate a good sale potential. The consumption pattern is estimated to be around 10 tonnes/year in different shapes. The price of the imported tube of 1/2 x 12 in is around ₨ 200 and a 500 g. solid silicon nitride shape, for suspension of load at high temperature, costs about ₨ 1700.

Powdered silicon is made into a semidry paste, which is subjected to pressing or extrusion or slip casting to obtain the desired shapes. The shapes are dried, and pre nitrided in a nitriding kiln at 1320-1400°C. This is followed by machining to required tolerance and full nitriding.

Predesign cost data (basis 500 kg/year)

| | |
|---|---|
| Land and building | ₨ 2.0 lakh |
| Plant and machinery | ₨ 5.2 lakh |
| Working capital | ₨ 0.6 lakh |
| Cost of production | ₨ 110/kg. |

Main equipment include jaw crusher, disc crusher, vibratory ball mill, 50 ton press, horizontal and vertical extrusion machine, nitriding kiln, lathe anddipper machine. All items are available indigenously.

About 100 pieces of hollow shapes, 5-12 in by 1/4-1 in were produced at the Central Glass & Ceramic Research Institute, Calcutta on bench scale. These pieces were found to have properties comparable to those of imported product. Consumer acceptability trials have shown that these are suitable for resisting high heat and thermal shock.

# New Machinery and Equipment

## CHEMICAL PROCESS EQUIPMENT

### Distilled Water Plants

Automatic distillation water plants operated electrically and manufactured entirely from stainless steel sheets, give pure distilled water at low operational cost. They are fitted with ejection type heating elements which will automatically cut-off the current, in case the water level goes below the heating level, preventing the elements from burning out. Available sizes are: 2 litres/hour, 4 litres/hour, 8 litres/hour, 20 litres/hour and 25 litres/hour.

For further information write to: Jason Oil & Engineering Company Private Limited, 32 Veer Nariman Road, P.O. Box 149, Bombay 400001.

### High Capacity Pressure Screen

A new, high performance, high capacity pressure screen is now being marketed worldwide by C-E Bauer, a subsidiary of Combustion Engineering, Inc. Identified as the HR$^{TM}$ pressure screen, the new development is more cost effective than conventional screens according to company executives. Several exclusive, patented design features permit higher shive removal efficiency when the unit is operating at the same reject rates as other screens. The converse is also true -- the pressurized unit can be operated at a lower reject rate while providing the same separation efficiency as other screens.

Because the HR pressure screen can reduce reject rates substantially, the follow-up reject refining system can be much smaller. This can be translated into realistic savings on the capital cost for the reject system, as well as saving in daily operating costs, according to T.F. La Haise, director of pulp equipment sales for C.E. Bauer. The new screen is available in two sizes and can be used advantageously in any pulping process.

One of the distinct design features of the HR pressure screen is the relatively small diameter of the screen basket when compared to the basket length. This design increases centrifugal forces, causing an unusually dense screening zone. This produces a minimal cross-sectional flow area, thus increasing screening zone velocity and minimizing rejects.

Normal operating pressure for the new screen is about 30 psi, although it can function up to 75 psi. More data can be obtained by contacting C-E Bauer, Springfield, Ohio, U.S.A.

### Triple Roll Mill

J.K.C. triple roll mill is used for manufacture of printing ink, paint, chemicals and cosmetics. It incorporates 3 chilled cast-iron rolls with relieved ends having a minimum Brinell hardness of 525. The rolls are hollowed, bored and arranged for water cooling. Each roll is mounted on self-aligning double-row of roller bearings and encased in CI rolling blocks with special arrangement for greasing the bearings and oiling top and bottom slides. The gears are all helical. Pressure is applied on the rolls either manually or through hydraulics. Four dial gauges give readings on roll parallelism to prevent improper wear on the rolls. Temperature gauges are included to give water temperature. Safety springs avoid roll damage caused by hard foreign particles. Side hoppers are made out of gun metal.

For further information write to: J.K.C. Engineers, 20 Bajanai Koil Street, Nandambakkam, Madras-600089.

## ELECTRONICS AND ELECTRICAL EQUIPMENT

### HRC Fuses

D-Type HRC fuses, manufactured by Bharat Lindner Pvt., Ltd., of Vadodara, are used for protection of low tension (below 500 V A C) electrical installations against short circuit and overload faults. The fuse comprises a ceramic base inside which a gauge piece of the desired rating is fitted. The D-Type HRC fuse link which has to be replaced when a fuse blows, is fitted between the gauge piece and the fuse carrier. The fuse carrier is screwed in the fuse base. Rupturing capacity is 51 KA AC and 4 KA DC. There is non-interchangeability between fuses of different ratings. Anti-vibration locking/seating arrangements are provided. For further information write: Jyoti Marketing & Projects Ltd., Bombay Shopping Centre, Race-Course, Vadodara, Gujarat-330005.

### Portable Infra-Red Thermometer for Non-Contact Temperature Measurement

Land Pyrometers Limited, UK, represented in India by Larsen & Toubro Limited, has developed a portable infra-red thermometer for accurate non-contact temperature measurement. Designated 'Cyclops', this new product is a significant step forward in the progress of temperature measurement technology.

'Cyclops' is a general purpose instrument intended for use in many different applications which are determined mainly by the range of temperatures encountered. It is designed to make accurate non-contact temperature measurements in situations where permanently installed systems are unnecessary, or uneconomic. It can also be used to scan for relatively 'hot' or 'cold' spots in many plant and process applications.

'Cyclops' works by detecting and focusing energy radiated from the surface of the object to be measured. It has an optical lighting system which enables the user to select the target and an infra-red detection system designed to convert very low levels of received energy into an accurate reading of temperature. The reading appears within the visual field of the selected targets.

For details please write to: Larsen & Toubro Limited, Instruments Division, P.O. Box. 278, Bombay-400038.

## Printed Circuit Board Drilling Machine

P.C.B. Drilling machine (Foot operated), Model PC-3, is used for drilling holes in printed circuit board of any material. High speed and controlled spindle run-out makes it possible to drill holes upto 0.5 mm without chip formation.

A solid tension-free aged cast iron base comprises of:

- drilling head along with motor
- hard chrome-plated bend column and
- table

Drilling head is designed for high speed operation. The spindle rotates on pair of precision magneto bearings and needle roller bearings at the other end. The spindle has direct drive eliminating vibrations during operations. Precision ground spindle with built-in arrangement for collet clamping gives compact design of spindle. Machine is foot operated wherein the movement of foot pedal actuates the table to move in either direction. Helical spring provides for smooth spring operation while drilling. Technical Specifications:

| | | |
|---|---|---|
| Spindle travel | : | 0 to 20 mm |
| Table size | : | 160 mm x 160 mm |
| Maximum size of board that can be drilled | : | 350 mm x 350 mm |
| Speed range | : | 500 r.p.m. to 15,000 r.p.m. |
| Motor | : | 1/10 H.P.A.C./D.C. Type |
| Total weight of machine | : | 18 kgs |
| Gross weight | : | 30 kgs |
| Accuracies | : | |
| Maximum spindle run-out | : | 0.005 mm |
| Squareness of spindle with base | : | 0.01 |
| Maximum-run-out of drill head in collet | : | 0.02 mm |

Enquiries to: HYT Engineering Corporation, 29/10, D-11 Block, MIDC Chinchwad, Pune-411019 (India).

### Ultrasonic Rat Repeller

Oriols Services and Consultants 4, Kurla Industrial Estate, Ghatkopar, Bombay-400086 have introduced an ultrasonic rat repeller RATATACK which emits sound waves above the human audible range but which is audible to rodents. RATATACK is used to great advantage in food processing plants, eating establishments, granaries, warehouses, godowns, cafetarias, departmental stores, vessels, furniture shops, shopping arcades, electricity distribution rooms etc.

This high frequency sound causes great stress on the rats, compelling them to flee from the area in which the unit is placed. The stress so created is not only disturbing to the rats, but also affects their feeding and mating habits which results in a smaller population of rats.

The RATATACK has two modes of operation: (1) continuous, (2) pulsed which give a wider control on the various types of rodents. Also the operating frequency can be so varied that rats cannot get used to this equipment.

The unit is small, light weight and is easy to operate and will effectively work in an area of over 100 sq. meters.

## ENGINEERING EQUIPMENT

### Dry Lubricant: Open Gear Applications

Said to be well suited for use in dusty conditions, an open gear lubricant, Moly-Paul Grade 842, has been introduced, incorporating 6 per cent molybdenum disulphide and graphite in a volatile solvent, which evaporates after application, leaving the gear teeth with a dry but flexible coating which is like paint when it hardens. The coating provides a low friction film between mating teeth and is suitable for low speed gears.

The compound is normally applied using a brush. When the application is to a gear train, the compound can be brushed into the teeth of one of the gears while the train is slowly rotated by hand, and it will transfer readily on to the teeth of all the gears. However, the task must be accomplished fairly quickly before evaporation occurs. Normally, it takes about 10 min. for drying to be completed. For gears working in dust laden atmospheres, it is important to ensure that the gear train is free from dust during the application of the compound. An advantage claimed for the compound over conventional lubricants is that it does not drip and the film adheres firmly to the surfaces of gear teeth, giving added protection against product contamination and corrosion.

Enquiries to: K.S. Paul Products Ltd., Nobel Road, Eley Estate, London, N.18, 3 DB.

Oil Fired Tilting Furnace

Suitable for the melting of non-ferrous metals as well as cast iron, the furnace is made of an all-steel body, fitted with high duty cast iron parts.

The shell is made of 6 mm thick M.S. plates so as to withstand rough handling. The cast parts are made out of superior chrome nickel alloy castings.

Specifications:

| | | |
|---|---|---|
| Capacity | : | 90 kg of cast iron, brass copper or 27 kg. of aluminium per charge |
| Consumption of oil | : | 10 ltrs. per hour for ferrous metals 11 to 13 litres for non ferrous metals |
| Approx. melting time | : | 1 hour for preheating for all metals. 1 hour per charge for cast iron, ½ to ¾ hr. per charge for non-ferrous metals |
| Crucible used | : | Indigenous (capacity 90 kg. C.I) |
| Capacity of Blower | : | 11.5 C.M. per min. or 300 to 350 mm. in Manometer reading |
| Motor | : | 1 H.P 2880 rpm 400/440 V/3/50 Cy. |
| Floor Space required | : | 1750 mm x 2500 mm |
| Max. Height | : | 1750 mm |
| Nett. Weight | : | 800 kg approx. |

Standard Equipment

| | |
|---|---|
| Burner unit | 1 No. |
| Overhead oil tank | 1 No. (cap 45 litres) |
| Filter for oil | 1 No. |
| Blower with motor, pulleys & V Belts | 1 No. |
| Crucible | 1 No. (cap 90 kg. C.I.) |

Produced by: Govt. of India Production Centre Ettumanur, Kerala.

Marketed by: National Small Industries Corporation Limited, New Okhla Industrial Estate, New Delhi-110020.

## Universal Punching and Shearing Machine

Universal punching and shearing machine is used in plants working with sheet-metal or fabricating steel where maximum output is desired with a minimum amount of equipment. This machine combines five operations i.e. Shearing plates, sections, round and square bars; cropping, notching and punching.

This machine is well constructed with rolled steel plates of high resistance to deformation. The outstanding feature of this machine is that it has separate clutches and slides enabling three men to work on it simultaneously and independently of each other for maximum production. To ensure quiet operation the shaft and all other highly stressed parts are made from good quality steel.

Drive: 3 HP, 3 Phase, 50 cycles, compact squirrel cage motor. This machine is equipped with robust positive rolling key clutch, which is guaranteed to transmit at all times the maximum torque, trouble-free.

The machine is equipped with a hand lever for engaging the clutch leaving the other hand free for handling the material. Each clutch can be operated for single or continuous strokes. In single stroke the clutch is disengaged after one revolution, when in continuous operation, the clutch remains engaged. Accidental switch-out to continuous operation is positively prevented.

There are three slides in this machine. The structural design enables the driving forces to be directed so that they always act in the direction of the movement ofslides and are located above the working position. Any angular force occurring is thus reduced to minimum. The forces generated into the drive lever are always at right angle to the fulcrum shaft: therefore, shear force cannot occur here either. The slides never move directly on the body plates of the machine. They travel on extra long ways made from antifrictional material. The machine is equipped to solve any problem connected with shearing and punching. All moving parts are provided with lubrication fittings. One spot lubrication system is available which allows the lubrication of entire machine from one central place.

General specifications

| | | |
|---|---|---|
| Driving Shaft Speed | RPM | 480 |
| Motor Power | HP | 3 |
| Strokes per minute | | 53 |
| Net weight | kgs | 1200 (approx.) |
| Overall Dimensions | mm | 1315x600x1290 |

## Standard Equipment

a) 1 pair of blades for angles
b) 1 pair of blades for rounds and squares
c) 1 pair of balesd for shearing blades
d) 1 notching tool with lower blades
e) 1 punch
f) 1 straight die holder with 1 round die for punching holes in standard flat sections.

## Capacities

| | |
|---|---|
| Cropper | MM |
| Crops square section | 32 |
| Crops round section | 32 |
| Crops angle and T section at 90° | 80 x 80 x 8 |
| Crops angle and T section at 45° | 65 x 65 x 7 |
| Crops channel section at 90° | 125 x 65 |
| Crops channel section at 45° | 75 x 40 |
| Crops beam section at 90° | 125 x 65 |
| Crops beam section at 45° | 100 x 45 |
| **Shears** | |
| Shear mild steel plate | 10 |
| Trim the plates (width of strip twice its thickness | 12 |
| Shear the flat at one stroke | 120 x 12 |
| Length of shear blades | 220 |
| **Notcher** | |
| Cuts off at one stroke up to | 40 x 60 |
| In plates of thickness upto | 8 |
| **Punch** | |
| Punches holes in M.S. plates | 25 dia x 10 |
| Punches holes in M.S. plates | 20 dia x 12 |

The Tensile Strength of the material: 45 kgs/mm$^2$ (64000 lbs/in$^2$)

Enquiries to: The National Small Industries Corporation Ltd.,
New Okhla Industrial Estate, New Delhi-110020.

## Vacuum Isolation Valves

Isolation valves, designated PV-E Series, are said to have exceptionally low power consumption and low operating temperatures as well as being among the most light and compact valves of their type available.

Two coils and an electronic switching circuit enable high power to be applied for a very short period to open the valve; power is then reduced automatically to the much lower level required to hold it open. The valves can be opened against a pressure differential of one atmosphere in either direction and operating temperature will not exceed 35°C above ambient, it is stated. A stainless steel bellows assembly isolates the valve body, and drift-proof micro-switches give positive indication of valve state, Pressure range is $10^{-9}$ to 1,000 mbar.

The three valves in the range weigh 0.68, 1.5 and 3.7 kg. respectively, The largest is 230 mm. high. Standard ISO-SC-type pipeline connections in 10,25 and 40 mm. sizes respectively are used, and packs of quick-release screwed coupling components are available as accessories.

Enquiries to: Edwards High Vacuum, Manor Royal, Crawley, West Sussex RH 10 2 LW.

## Wing Type Sand Mixer

Suitable for mixing foundry sands, such as green sand, facing sand, baking sand, core making sand and other special sands, the sand mixer is made of all steel body with a special mixing wing mounted on a vertical shaft with ball and thrust bearings on both ends.

### Specifications

| | |
|---|---|
| Mixing capacity | 60 litres per batch (mixes about 500 litres of sand per hr) |
| Speed of mixing wing | 30 rpm (driven by bevel gearing and V belts) |
| Motor | 3 HP, 930 rpm/400/440V/3/50 cy. |
| Floor space required | 1000 mm x 1200 mm |
| Max. height | 1100 mm |
| Net weight | 350 kg. approx. |

### Standard Equipment

| | |
|---|---|
| Motor with V Pulleys | 1 No. |
| V Belts | 5 Nos. |
| Side rails | 1 Pair |

Produced by: Govt. of India Production Centre, Ettumanur, Kerala.

Marketed by: National Small Industries Corporation Ltd., New Okhla Industrial Estate, New Delhi-110020.

# Industry Roundup

This section highlights policies and procedures, guidelines, the present status and future prospects in certain industries as well as the latest available data in respect of such industries.

## LEATHER FOOTWEAR INDUSTRY

### Introduction

Indian leather industry is one of the oldest industries serving the village economy. In India, the leather industry still exists largely as cottage industry. Today India has 600 million people, 185 million cattle, 61 million buffalo, 70 million goat, 41 million sheep producing 34.4 million hides, 39 million goat and 20 million sheep skins. India is the largest livestock holder in the world.

### Policy

Till recently, India was the major exporter of raw hides and skins. After independence in 1947, the export of raw hides and skins was gradually banned. Leather footwear is one of the major items of finished goods and it accounts for 8% of the total leather exports. The leather footwear industry is reserved for exclusive development in small scale sector.

### Status of the industry

In India, leather footwear is produced mainly in cottage and small-scale sectors. Therefore, there is no correct data on the production of leather footwear. According to the report of Fourth Plan Footwear Export Committee constituted by the Ministry of Commerce, it was estimated that the production of footwear in the entire cottage sector of the country was 83 million pairs. There are about 8 units in the organised sector with an installed capacity of 193.03 lakh pieces producing about 114.16 lakh pieces valued at Rs 2209 lakhs. Consumption of leather footwear is slightly higher than 250 million pairs. The per capita consumption of leather footwear in India during 1975-76 was 0.42 pairs. Production of leather footwear in organised sector and cottage and small scale sector is given in Tables I & II respectively. Exports of leather footwear for the past five years is given in Table III.

## TABLE I

### Production of leather footwear in the organised Sector

| Year | No. of units | Installed capacity | Production lakh pairs | Value in ₨ lakhs |
|---|---|---|---|---|
| 1976 | 7 | 188.79 | 151.52 | 2716 |
| 1977 | 7 | 188.79 | 142.76 | 2923 |
| 1978 | 8 | 193.03 | 114.16 | 2209 |

## TABLE II

### Production of leather footwear in the cottage and small sector

| Year | Production in lakh pairs |
|---|---|
| 1972-73 | 1380 |
| 1973-74 | 1380 |
| 1974-75 | 1380 |
| 1975-76 | 1380 |
| 1976-77 | 1800 |
| 1977-78 | 2150 |
| 1978-79 | 2300 |

## TABLE III

### Exports of leather footwear

| Year | Quantity lakh pairs | Value in ₨. lakhs |
|---|---|---|
| 1975-76 | 101 | 1910 |
| 1976-77 | 152 | 2800 |
| 1977-78 | - | 1746 |
| 1978-79 | N.A | 2336 |
| 1979-80 | N.A | 1805 |

## Raw Materials

The main raw materials for leather footwear industry is the finished leather. The leather is obtained from hides and skins of livestock which India has in abundance as already indicated. Better quality leather is exported and export-reject quality is available for domestic market. In the last few years, the prices of leather has risen by 20 to 30%.

## Machinery

For the processing of hides/skins and the manufacture of footwear, machinery of different types, sizes and ranges is required. At present, there are 7 units registered to manufacture leather and leather footwear machinery, but only 3 units are under production. Production, exports & imports of leather and footwear machinery is given in Table IV.

### TABLE IV

Production, Exports and Imports of leather and footwear machinery

| Year | Production ₨ Million | Exports ₨ Million | Imports ₨ Million |
|---|---|---|---|
| 1974-75 | 2.957 | 0.436 | 3.732 |
| 1975-76 | 2.359 | 0.834 | 15.505 |
| 1976-77 | 2.718 | 0.665 | 12.211 |
| 1977-78 | 3.864 | 0.237 | 15.345 |
| 1978-79 | 14.934 | N.A | N.A |

## Manufacturing Process

The manufacture of footwear involves several processes, beginning with the marking on the material. The uppers and bottom parts are cut according to the marking. This activity is known as clicking. The uppers are then fitted on the sole with the help of 'last'. This gives a shape to the footwear. To give an arch to the footwear, shank is fitted between insole and sole. This process is followed by sole attaching, trimming, sticking, heal building, attaching and finishing.

## Demand & Scope

There is a massive demand for India's footwear in the world market. During 1977-78, India exported 153 lakh pairs of footwear worth Rs 240 million. India exports several types of footwear but the maximum demand is for leather footwear. The export demand for leather footwear will be 270 lakh pairs per annum by 1982-83. As against the estimated future demand, the present installed capacity is 2439.5 lakh pairs. There is a demand-supply gap of 660 lakh pairs per annum in leather footwear. There is a scope for 750 more units in leather footwear industry.

## Conclusion

Inspite of high demand, the problems of availability of quality raw material, under-utilisation of installed capacity, lack of quality consciousness, energy crisis, pollution by effluents, lack of professional management, inadequate market intelligence etc., are hindering the growth of the industry. With proper planning, cooperation among various organisations and a will to succeed, the above problems can be solved and the industry is sure to march ahead and can emerge as oneof the top industries that earn more foreign exchange with high employment potential. (MSR)

*Section IV*

# Current Technical Literature

Copies of articles/documents listed in this section are available on payment of Rs 5/- for the first 5 pages or part thereof and Re 1/- for every subsequent page of the photocopy or xerox copy of the article/document. While placing the order please mention the CTL number of the SENDOC Bulletin.

| Subject Index | CTL Nos. |
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| Electrical Industries | 516-518 |
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## SCIENCE AND TECHNOLOGY

459. ----: Technology: made in Italy. Scientific American, 1980, 243(6), I3-I30.

This special report examines the technological innovation and applications in Italy's major industrial sectors. It highlights both the limitations and the many achievements, and focuses particularly on the organization and finance of research and development through both the public and private sectors of industry.

460. ECKAUS, R.S.: Criteria and orientations for science and technology for development. Technology in Society, 1979, 1(2), 123-135.

Discusses the criteria by which technological decisions should be judged, the methods for choosing technologies, the interactions between the methods of choosing technologies and the characteristics of the technologies chosen, the orientations for technological adaptation in developing countries and the policy issues related to decisions about scientific programmes in developing countries. (JBS)

461. GOONATILAKE, S.: Technology as a social gene. Journal of Scientific and Industrial Research, 1979, 38(7), 339-354.

This paper puts forward some general propositions about the nature of technology and its relationship with the socio-economic system. The paper is divided into two parts. In the first part, the broad outlines of the general propositions made by the author are given, specially as to the social conditions and situations under which technology is created, transmitted and absorbed. In the second part, the paper takes as an example one technology, namely the motor car industry, and examines how far this fits into the general propositions relating to technology generation, transmission and absorption. Later, a discussion is given relating the general propositions about technology to social evolution and transformation. (AA)

462. POTHEN, P.: Technology: Despoiler or preserver? Chemical Age of India, 1980, 31(11), 1111-1115.

Discusses the evolution of technology and technical progress in relation to standard of living. Highlights the aspect of energy conservation and energy substitutes for economy. (BS)

463. ROBERTS, E.B.: What do we really know about managing R & D? Chemtech, 1980, 10(3), 156-160.

Discusses the three important areas of staffing, structure and strategy in running an R & D organisation.

## Information Systems

464. IRA UNAMBOWE: Unified information system for appropriate technology. Karmantha, 1981, 8(1), 23-26.

The dissemination of information on appropriate technologies pre-supposes the existence of: (a) the systematic collection of data on efficient and suitable techniques which exist in different organisations, (b) the effective communication of this information to the developing countries; and (c) advisory services on the application of these technologies, wherever necessary. The existing infrastructure for the systematic organization, exchange and networking at national and international levels is examined. (JBS)

465. KABACK, S.M.: Patents: Keys to knowledge. Chemtech, 1980, 10(3), 172-177.

Patents are an exceedingly important information source. It is also true that patents are frequently undervalued and underutilized by those who could profit from them. The chief reason for this is that most people have never been given a basic grounding in the use and value of patents. The importance of patent information and the major sources used for obtaining that information are discussed. (JBS)

466. MAMAK, I.M.S.: Identification of patentable inventions. Journal of Scientific and Industrial Research, 1981, 40(6), 356-359.

Identifies various factors which go into obtaining the best possible patent protection for an invention developed by a research group and which may prove to have a lasting commercial and industrial use.

## FOOD AND ALLIED INDUSTRIES

467. IENGAR, N.G.C. et al: Application of pressure parboiling process for the production of bulgur wheat. Journal of Food Science and Technology, 1980, 17(6), 263-265.

A simple, quick and less costly method of production of bulgur wheat by pressure parboiling on large scale has been developed. The prodkct is of acceptable quality for use in the midday meal programme for school children and for preparing dishes. The cost of bulgur wheat production employing this technique has been worked out. (AA)

468. JAIN, V.K. et al: Preparation of tomato-pomace as feed for dairy animals. Dairy Guide, 1980, 2(6), 13-15.

A hand-operated laboratory model press was designed and fabricated for extracting moisture from tomato-pomace, which is available in considerable quantity from factories manufacturing tomato ketchup. The laboratory model was found to be very suitable for removal of the moisture to the extent of 53% from tomato-pomace. The concentrated tomato-pomace prepared as such can be easily sun-dried, powdered and mixed with concentrate mixture and fed to dairy animals. (AA)

469. KRISHNA, G. et al: The trend of the use of amino acids in poultry diet: A review. Poultry Guide, 1980, 17(6), 65-73.

470. MAHADEVIAH, M. & GOWRAMMA, R.V.: Metallic contamination in canned fruit and vegetable products. Indian Food Packer, 1980, 34(1), 35-50.

Metallic contamination in canned fruit and vegetable products poses a problem for the consumers as well as the manufacturers of these products. Sources of contamination, research investigations, on the contamination and toxicity of metals like aluminium, arsenic, copper, tin, lead and zinc and the analytical methods for their determination have been reviewed. Limits for these metals in different countries have also been incorporated.

471. PEIRIS, H.C.S.: Jaggery - An ideal substitute. Karmantha, 1981, 8(1), 2-5.

A method of jaggery manufacture combining the traditional and modern methods, best suited to obtain maximum profit, is discussed. (JBS)

472. PURNANANDAM, T. & MATHUR, V.S.: Standardization and quality control vis-a-vis regulations for food colours. ISI Bulletin, 1981, 33(3), 99-102.

Synthetic food colours are used all over the world to enhance the visual appeal of foodstuffs and to give them an appetizing appearance. ISI certification of permitted coaltar food colours has been made compulsory in India in the interest of health safety. The authors review in this paper the position regarding standardization in this field and present a cross-section of views on the proposed ban on coaltar food colours. (AA)

473. RIZEK, R.L. et al: USDA's nutrient data bank. Food Technology in Australia, 1981, 33(3), 112-114.

Discusses the organization, data collection, coding, data bank format of the files for each food group and computer system features of the nutrient data bank operating at the US Department of Agriculture's Consumer Nutrition Centre. (JBS)

## OILS AND FATS

474. ----: Economics of the import of edible oilseeds vis-a-vis rape seed oil. The Oils & Oilseeds Journal, 1980, 33(5-6), 7-8.

475. ----: Growing use of palm oil. Oils & Oilseeds Journal, 1980, 32(4), 11-12.

Discusses the newer applications of palm oil.

476. ----: Need for a national policy on edible oils. Oils & Oilseeds Journal, 1980, 33(1), 7-8.

Discusses the supply and demand and production of edible oils and suggests some policy modifications.

477. ----: World oilseed forecast: below last years' record. Journal of the American Oil Chemists' Society, 1980, 57(8), 585A, 586A, 588A, 590A, 620A-622A, 625A & 627A.

Gives a series of reports on oilseed production, imports, exports and consumption of oils andfats for specific nations based on USDA reports.

478. SINHA, S.K.: Vegetable oil as a source of raw material for chemical industry in India. Chemical Age of India, 1980, 31(10), 1051-1064.

The wide scope for development of oleochemical industry in India has been presented. All the important groups of commercially used oleochemicals have been grouped in 11 different tables on the basis of the chemical nature of the non-fatty reactant. Usages together with trade names have also been included in these tables. Various suggestions have also been given for proper utilisation of various oils by converting them into more value-added products. The author has given the reasons for the stagnant status in the development of oleochemical industry in India, and the remedial measures for its improvement. Suggestions have also been given for the products on which India should concentrate for export market. In addition to 11 tables the paper contains three diagrams including 'the production programme of a model integrated fatty acid and oleochemical manufacturing company'. (AA)

479. SWAMINATHAN, M.S.: Augmenting the resources of oils and fats. Chemical Weekly, 1981, 26(28), 76-80.

Highlights the significance of dietary fat and discusses the scope for the production of oilseed crops. (MSR)

480. SWAMINATHAN, M.S.: Augmenting the resources of oils and fats. Chemical Weekly, 1981, 26(29), 77, 79, 81, 82, 84-84C.

Discusses the steps to be taken to improve the resources of oils andfats.

481. VIMAL, O.P. & NAPHADE, K.T.: Utilisation of non-edible oil seeds-recent trends. Journal of Scientific & Industrial Research, 1980, 39(4), 197-211.

Presents an integrated view of the multi-functional aspects of non-edible oilseeds so as to promote their maximum utilisation.

## PAPER PULP AND ITS PRODUCTS

482. ----: Paper mills in N-E region. Indian Pulp & Paper, 1980, 35(3), 7-8.

Gives the details of paper projects that are being implemented and proposed in Nagaland, Cachar, Nowgong and Tripura.

483. ATTWOOD, D.: Paper and board industry makes the most of waste. Indian Pulp & Paper, 1980, 35(2), 3-5.

Discusses the utilisation of waste paper for production of paper and board.

484. FADL, N.A et al: Hardboard from cooked and blended rice straw by cotton stalk. Indian Pulp & Paper, 1980, 35(1), 19-22.

The chemical analysis of rice straw pulp produced by Asplund processes (water pulp) shows that it contains a high percentage of silica and a relatively low lignin content. This was reflected on the low quality of board produced when compared to that obtained from other raw materials such as cotton stalk pulp. Hence, trials were done to improve the quality of rice straw hardboard by blending water pulp of ricestraw and cotton stalk at different ratios. Also treatment of raw material with 3% sodium hydroxide (soda pulp) was effected. It was found that bending strength was improved by blending with cotton stalk and by cooking with sodium hydroxide. However, water resistance was improved in case of blending water pulps but disimproved in case of blending soda pulps. (AA)

485. JANGALGI, N.R.: Possible use of lemon-grass in paper making in small unit. Indian Pulp & Paper, 1980, 35(3), 11-14.

## PACKAGING

486. ----: LDPE for milk packaging. Plastirama, 1980, 11(1), 11-14.

Indicates the advantages of low density polyethylene milk sachet packaging over glass bottling system, specifications of LDPE milk sachet film and manufacturing guidelines. (KSDR)

487. ----: Packaging developments: machinery and equipment. Manufacturing Chemist and Aerosol News, 1979, 50(9), 39,42,44,46,49,58.

Outlines some of the features of the packaging machinery such as volume filling, syringe filling, weigh filling etc. (MSR)

488. ATHALYE, A.S.: Woven sacks of HDPE & polypropylene. Popular Plastics & Rubber, 1980, 25(9), 3-5 & 10.

Indicates the distinct advantages of HDPE and PP sacks over the conventional jute/hessian bags, estimated demand projection for sacking & hessian for 1982-83 and 1987-88 and also the energy requirement for conversion of various items. (KSDR)

489. KEER, D.W.: Polyurethane adhesives & waterbased gas barrier adhesives for packaging. Paperprintpack India, 1981, 19(1), 53-58.

Specifically relates to adhesives used by the flexible packaging industry and shows the way to reduce significantly the cost of using those adhesives with little or no investment in new laminating machinery.

## PLASTICS

490. AIYAR, A.H.S.: Plastics industry poised for growth. Chemical Weekly, 1980, Annual Jumber, 217-220.

Production, imports and demand of plastics raw materials are given. Impact of petrochemicals and commodity-wise plastics exports and demand of organic chemicals are given in tabular form. (MSR)

491. MEHTA, N.C.: Plastics-opportunities in the 80's. Perfectpac, 1980, 20(12), 9-16.

Gives the domestic and world demand for thermoplastic and high performance engineering resins. Examines the technological development and availability of raw materials. (BS)

492. VARGHESE, K.A.T: Blow moulding - processing. Popular Plastics & Rubber, 1980, 25(11), 13-19.

Discusses the extrusion blow moulding process, production faults, causes and remedies, followed by injection blow moulding principles, comparison between extrusion blow moulding, dip blow moulding and injection blow moulding. (KSDR)

## RUBBER

493. ----: Rubberised coir products. Karmantha, 1981, 8(1), 6-8.

Rubberised coir is chiefly used in upholstary, cushions and mattresses and is generally produced in the shape of blocks or slabs by spraying concentrated compounded rubber latex into curled coir fibre and vulcanizing it. Factors for the success of the project such as quality of raw materials, machinery, processing and market survey are discussed. (JBS)

494. SEYMOUR, R.B.: New dimensions in rubber technology. Popular Plastics & Rubber, 1980, 25(9), 31-36.

Gives annual worldwide consumption of synthetic elastomers, new rubber consumption forecast for US and Canada for 1979, 1980, 1985 and 1990, and new rubber consumption forecast for West Europe for 1979, 1984 & 1989. (KSDR)

495. VENKATASUBRAMANIAN, K.N. & MAHESHWARI, S.K.: Review of feed-stocks position for synthetic rubber for present and future. Popular Plastics & Rubber, 1980, 25(12), 38-41.

Gives the future demand and supply position of all types of rubber in 1982-83, 1983-84, 1987-88 and 1988-89, perspective production plan for alcohol-based chemicals, comparative cost analysis of alcohol-based and petro-based SBR, butadiene plant capacities and anticipated production, and estimated requirements of butadiene. (KSDR)

## LEATHER INDUSTRY

496. ----: Leather: Unsound base. Leather Processing, 1980, 4(1), 21-33.

Reviews the exports of finished hides and skins, footwear & components, finished leather and leather goods giving export statistics from 1971 to 1980.(BS)

497. CHAVAN, N.S.: Leather industry in Maharashtra. Leather Processing, 1981, 4(5), 36-38.

Reviews the status of the leather industry in India giving statistics of livestock population in India, projected availability of hides and skins in India and personnel engaged in Indian leather industry.(BS)

498. CHOUDHURY, G.R.: Vertical integration of leather industry - Recession/prospects. Lexport Bulletin, 1981, 3(7), 57-61.

Reviews the export trends of leather industry during 1978-79, 1979-80 and estimated exports for the years 1980-81 and 1981-82. (BS)

499. JAYARAMAN, K.S.: Process for full chrome sheep nappa. Leather Markets, 1981, 10(9), 27-28.

Gives the process for garment leather incorporating fullness properties in it.

500. KAMAT, D.H.: Alternative sources and technology for making nappa and softy leathers. Leather Science, 1980, 27(7), 226-228.

Possibility of making nappa and softy leathers from buffalo, cow and goat skins by certain modification in bating, pickling, tanning and fatliquoring is indicated. The approach consists of acid bating in addition to normal bating, pickling in the presence of naphthalene sulphonic acid, retanning with chrome syntan and fatliquoring using a mixture of marine and synthetic fatliquors. Variety of leathers such as softy shoe upper, clothing and gloving leathers could be produced following the above approach. (AA)

501. MCILHENNY, D.F.: Market segmentation and positioning in the footwear industry. Indian Footwear, 1981, 5(1), 35-40.

502. VALLOTTON, A.: Dyeing assistants for the leather industry. Indian Leather, 1981, 14(12), 17-23.

Discusses the different conditions to be maintained while dyeing leather.

503. ----: Design and significance of demineralising plants. Chemical Age of India, 1980, 31(10), 1069-1070.

Discusses the design parameters and gives a scheme for demineralising plants. (BS)

504. ----: Development pattern for ancillary industries in relation to building construction activity. Industrial Researcher, 1981, 8(1), 45-51.

During the course of construction, many building materials are used such as cement, steel, bricks, wood, sanitaryware, glazed tiles, sheet glass, wired glass, stoneware pipes, mosaic tiles, decorative tiles and aluminium extruded products (fixtures) etc. In terms of their share in the total cost of building, cement, steel, bricks and sanitaryware account for about 10 to 15 per cent each, followed by other ancillaries such as glazed tiles, wood and stone which roughly account for about 2 to 5 per cent. The present status, the enduses as well as the scope for ancillaries such as cement, steel, bricks, glazed tiles, sanitaryware, stoneware pipes, sheet glass and aluminium extruded products are reviewed. (JBS)

505. de SILVA, N.: IDB develops new lime kiln. Karmantha, 1981, 8(1), 11,13.

The Industrial Development Board of Sri Lanka has been successful in developing a low cost fuel-saving kiln which could be used to burn even niocene limestone.

506. RAMACHANDRAN, K.S.: Mining & mineral based industries in Orissa. Indian Ceramics, 1980, 22(12), 313-316.

Reviews briefly the status of iron ore, manganese, chromite, coal, limestone, refractories, quartz and quartzite, bauxite, nickel, beach sands and vanadium industries in Orissa.

## MECHANICAL ENGINEERING

507. ----: Quality control systems in maintenance: Principle-methods-safeguarding. Chemical Weekly, 1981, 26(24), 85-88.

Planning maintenance service, pre-requirements for maintanance, identification of sources of faults and aim of testing and checking in quality control have been discussed. (MSR)

508. BALAKRISHNAN NAIR, K.G.:& KRISHNADAS NAIR:
Quality control of steel forgings.
Tools and Alloy Steels, 1980, 14(2), 39-46.

Production of steel forgings involves a number of operations. With careful control of each of the operations, forgings of consistently good quality can be produced. The process control and inspection aspects involved in the quality control of steel forgings are discussed. (CS)

509. EDDINGTON, I. & EDDINGTON, N.: Noise abatement in foundries. British Foundryman, 1980, 73(10), 275-276.

Introduces a nomograph as a guide to noise control in foundries.

510. HAAG, T.H.: The why's, When's and How's of technical service. Resin Review, 1980, 30(1), 23-27.

Technical service is assistance that a supplier gives to a customer or a potential customer in order to maintain or gain a sales position. However, in the company's overall operations, it is a complex activity that requires careful planning if it is to be effective and profitable. A general guide based on experience and observations is outlined. (JBS)

511. SETHNA, P.F.: Cost reduction by integrating materials handling into the plant layout. Machine Building Machine Building Industry, 1980, 19(3), 11-13.

Describes the importance of the materials flow pattern and the steps to be taken for efficient materials handling. (KCR)

512. WHEELER, D.: Plant and equipment survey. Mixers-Part I. Processing, 1981, (Jan), 18-19, 21,23,25, 27,29, 32.

Concentrates on mixers for powder, heavier duty pastes, doughs and mastics, with a description of the variety of mixers in this field and their field of application. A table listing 46 manufacturers in this field in the UK, categorises equipment between batch and continuous operation and then according to texture of the mix for ease of assimilation of the user.

## METALLURGICAL INDUSTRIES

513. ----: Zinc Diecasting, (Technical file No. 82) - Engineering, 1980, 220(10), I-VIII.

Modern techniques being applied to zinc pressure diecasting are giving the process a competitive edge compared with more recent plastics - moulding processes. Part I presents the process and the technology. Part II presents the techniques and the materials. (MVS)

514. POOLEY, F.D. et al: Processing profit from 'valueless' waste. Processing, 1981, (March), 39.

An alkaline leach process capable of recovering zinc and lead from metallurgical wastes has been developed the cost/profitability of which is dependent upon the zinc content of the waste and also upon zinc's current market value. (JBS)

515. WALL, A.J. & COCKS, D.L.: Developments in zinc die casting technology. British Foundryman, 1980, 73(10), 292-299.

## ELECTRICAL INDUSTRIES

516. ----: Industry Profile-Electric motor industry. Industrial News Digest, 1981, 4(3), 3-5.

Outlines the development of the industry, production pattern, demand, constraints on capacity utilisation, future scope and export/import.

517. AGASHE, P.C. & VIMALA, S.: Instrumental techniques for qualitative assessment of electrical insulation. Machine Building Industry, 1980, 19(5), 7-10.

Presents the application of a few techniques, broadly based on thermoanalytical, spectroscopic and chromatographic principles as utilised in maintaining the quality of the product. (CS)

518. RAI, V.S.: Mills can cut fuel cost by using right motors. Indian Cotton Mills' Federation Journal, 1980, 27(3), 4-10.

Provides several useful tips on the right choice of motors in textile industry in order to achieve fuel economy. Deals with such aspects as motor selection, oversized motors and their impact, selection and replacement of drives. Tables are provided on several items showing consumption ratio of product cost to power, etc. Economic feasibility chart is also shown for various types of machinery used in the textile industry. (CV)

519. ----: Report of the panel on ultrasonic and nondestructive testing equipment.
Electronics Information Planning, 1980, 7(9), 567-599.

Estimates the present status of technology including the current manufacturing capacity of ultrasonic and nondestructive testing (NDT) equipment which finds a wide range of application in industry and medicine. Identifies a number of techno-economically viable areas for this equipment applications and suggests a coherent R & D programme to be pursued in India. Also gives the future requirements for the next ten years. (VVR)

520. CHIMNI, R.S.: New generation of batteries for applications in electronics.
Electronics For You, 1980, 12(9), 23-28.

Gives the important parameters of primary and secondary batteries, i.e., capacity, energy density, shelf life for low and high temperature, open circuit, and on load voltages. Discusses the various types of batteries and their characteristics, applications and maintenance. (BSR)

# SENDOC Services

Featured in this section are technical enquiries that were received and the services rendered by SENDOC during the month of August 1981. The charges for short technical enquiries will be ₨ 5/- to ₨ 10/- per typed page. Industry profiles already available with SENDOC are charged at the rate of ₨ 10/- each.

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| Sl. No. | Enquirer | | Service Rendered |
|---|---|---|---|
| 3. | Ent. - Andhra Pradesh | : | Profiles on: Sodium Silicate, Laminated Jute Bags, Guar Gum, Gummed Paper Tape, Vermicelli, Camphor, PVC Pipe Fittings, PVC Insulated Cables, Gum Paste, Pure Catachin from Khair Trees, Double Boiled Linseed Oil, Bleaching Dyeing & Screen Printing, Wire Nails, Fabrication Unit, Ferrous & Non-Ferrous Foundry, Nickel Sulphate, Match Splints, Sand Paper, Building Bricks. |
| 4. | Ent. - Bihar | : | Profiles on: Paper Pins, Paracetamol, Stainless Steel Utensils. |
| 5. | Ent. - Gujarat | : | Profile on: Straw Board. |
| 6. | Ent. - Karnataka | : | Profile on: Rubberised Coir Mattresses. |
| 7. | Ent. - Madhya Pradesh | : | Profile on: TV Sets. |
| 8. | Ent. - Maharashtra | : | Profiles on: Chemical Lime, Paper Pins, Carbon Paper, Typewriter Ribbon, Briquettes from Saw Dust, Mosaic Tiles, Absorbent Cotton, Dall Mill, Handmade/Speciality Paper, Bolts & Nuts, Envelopes. |
| 9. | Ent. - Orissa | : | Technical Note on Cement Plant. |
| 10. | Ent. - Tamil Nadu | : | Profiles on: Cashew Shell Oil, Weighing Machines, Welding Electrodes. |
| 11. | Ent. - Uttar Pradesh | : | Profiles on: Hair Oils, Household Detergent Powder. |
| 12. | Ent. - West Bengal | : | Profile on: Fibre Glass Reinforced Plastic. |
| 13. | SI - Andhra Pradesh | : | Profiles on: Straw Board, Laminated Jute Bags, Domestic Pressure Cookers, Electric Alarm Clock, Carbon Dioxide Solidifier, Electronic Gas Lighter, Recovery of Zinc, Carbon, Electrode from used Dry Cells. |
| 14. | SI - Maharashtra | : | Profile on: Distrilled Water, Low Tension Porcelain Insulator. |
| 15. | SI - Orissa | : | Profile on: Paper from Jute Sticks. |
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Ent. - Entrepreneur; SI - Small Industry; DIC - District Industries Centre.

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# New Products and Processes

## ELECTRONICS AND ELECTRICAL INDUSTRIES

### Digital Optical Density Meter

An electronic instrument for measurements involving optical transmittance and optical density in spectrophotometry has been developed by Central Scientific Instruments Organisation, Chandigarh. It accepts electric signals from photo-tubes (or other devices converting optical signal to electric signal), which are amplified and measured against any one of the two scales provided in the instrument. One scale corresponds to optical density and the other to percentage transmittance. A function selector switch selects the scale of display. It is provided with zero offset control to cancel out the photo-tube offset. When the input is beyond the dynamic range of measurement, the same is indicated by means of suitable neon-lamps. The instrument can find applications in chemical, physical and biomedical analysis.

The broad specifications of the instrument include: range of measurement 0-2 comparative density; transmission 0-100%; out of range indication neon-lamp, display-3½ digit nixie.

The main raw materials/components required are ICs, transistors, diodes, capacitors, resistors, transformers, nixie tubes, switches and other hardware items. All the items are available indigenously except the ICs which are of imported origin but can be procured indigenously. If direct imports are desired, DC(SSI)/DOE's approval is necessary. Since the instrument is assembly oriented, the production machinery is not significant. Only the testing equipment, oscilloscopes, transistor tester, LCR bridge, power supplies, digital multimeter, stabiliser, etc., are needed.

The capital investment required to manufacture 100 units/yr. is estimated at ₨ 95,000 (fixed capital excluding land and building ₨ 45,000; working capital ₨ 50,000). An industry existing in a similar assembly oriented line of manufacture will need considerably less amount of fixed capital depending on the availability of equipment.

Terms of knowhow: lumpsum premium ₨ 5,000; recurring royalty 2½%; nature of licence non-exclusive; period of licence 5 years.

## Echoencephaloscope

Echoencephaloscope is an instrument used to examine the brain. It works on the principle of reflection of ultrasonic pulses by the tissue interfaces of the brain. Ultrasonic pulses are sent into brain by means of suitable probes. The reflected ultrasonic waves are picked up, amplified and indicated on a cathode ray oscilloscope and are relatively displayed with the transmitted pulses. The instrument is used to determine tumours, hematomes, etc., thus helping the physician to diagnose the brain irregularities easily. Echoencephalograms are easier to obtain and can be repeated several times without any adverse effect on the subject under test.

Central Scientific Instruments Organisation, Chandigarh has developed an echoencephaloscope which employs a two probe method and has three modes of operation--single probe mode, transmission mode and double probe mode. In the last mode, EEC from both sides of the skull are obtained and displayed on the scope simultaneously, which doubles the sensitivity of midline detection. Two prototypes have been made and tested successfully.

The raw materials/components required for its manufacture are ICs, transistors, diodes, capacitors, transformers, resistances, chassis, hardware, crystals, etc. The machinery required for assembling the instrument is a flypress, bench grinder, drilling machines and hand tools. The test instruments needed are oscilloscopes, pulse generators, RF oscillator, multimeter, power supplies, etc.

The total investment needed to manufacture 20 echoencephaloscopes/yr. is estimated at ₨ 1.5 lakhs (fixed capital excluding the cost of land and building ₨ 0.5 lakh; working capital ₨ 1 lakh).

The terms for knowhow transfer are: lumpsum premium ₨ 10,000 recurring royalty 5%; nature of licence non-exclusive; period of licence 5 years.

## Stand-by Storage Power Unit

The National Engineering Research and Development Centre (NERD) in Sri Lanka has commercialized a stand-by storage power unit which is capable of providing electric power at 230 volts AC from 24-volt storage batteries. The power supply is suitable for providing lighting and heating loads as well as for driving electric fans and motors. In the stand-by operation the stand-by lamps or other loads are switched on as soon as there is a power failure and remain in the "on" position as long as the battery voltage is higher than a preset voltage. It will automatically be switched off when the power supply is restored. In another model, the selected

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load is on mains supply and is switched to the stand-by power supply immediately there is a failure on the mains supply. When the mains supply is restored, the load is reconnected. In this model, the usual (pre-selected) fittings will function as stand-by fittings.

An advantage of the unit is that the battery will be charged from a circuit within the unit itself which is activated when the mains supply is restored.

The stand-by storage power unit is suitable for use in shops, offices, hospitals, homes and other places where stand-by power is required. As the power output is available at the normal mains voltage and frequencies, the usual electrical lighting fittings and heating appliances can be used.

Another application of this unit could be for isolated locations which are without a mains supply. In this instance the battery can be charged from a vehicle mounted DC generator, coupled to a windmill, or it can be charged from a solar panel. "No break" systems could also be supplied whereby the load can be continuously fed from the batteries through the inverter; the batteries could be re-charged from the mains when the mains supply is available.

As the inverter output is more or less a square wave the unit is not suitable for applications requiring a pure sinusoidal wave form.

The inverter consists of a square wave generator using transistors which is powered by two 12-volt 62-Ah lead-acid batteries. The transistors are switched by means of a timer working at 50 Hz. The pulse produced, when applied to the primary of the centre-tapped transformer, produces an alternating square wave signal. This signal is stepped up by the transformer action to 230 volts and it is applied to the load through a relay.

This relay is connected in such a way that theload is re-connected to the mains as soon as the power is restored. An additional set of contacts in the relay connects the third winding of the transformer through a rectifier in order to charge the battery.

For further, details contact: Mr. A.L.M. Perera, Head Department of Techno Economics and Materials, NERD centre, Ekala, Jaela, Sri Lanka.

## INSTRUMENTS AND INSTRUMENTATION

### Dissolved Oxygen Analyzer

The Central Scientific Instruments Organization, Chandigarh has developed an analyzer for measuring dissolved oxygen in effluents, water, etc. The quantity of dissolved oxygen is an important parameter to be determined and controlled in applications like discharge of industrial effluents, water treatment for boilers, and fermentation. The device can also be used for sewage treatment/disposal, etc.

It is based on the principle of polarography. Its sensor comprises a gold electrode, a silver anode and a thin semi-permeable membrane. This along with the liquid, in which oxygen is in dissolved state, forms the complete system for measurement. The oxygen in the liquid gets reduced at the cathode releasing electrons. This flow of electrons constitutes a current which is amplified by a current amplifier and a meter indicates the quantity of dissolved oxygen.

The institute made three analyzer units which showed a satisfactory performance.

The raw materials/components required in its manufacture are ICs, resistors, potentiometers, transformers, switches, teflon membranes, gold, silver probes, capacitors, diodes, transistors, IC-bases, PCBs, meters etc. All the items except the ICs are indigenously available. If direct import of the ICs is desired approval of the DC (SSI)/DOC should be taken. This being an assembly oriented product, the production machinery required is not significant. The test instruments needed are digital multimeter, avometer, constant temperature bath, refrigerator, heating mantles, magnetic stirrer, aerater, etc. The materials required for calibration purposes are oxygen free nitrogen gas, deionized water, chemical laboratory glass wares and chemicals. All these items are indigenously available.

The institute has estimated a demand of 100 pieces/yr. However, the entrepreneur is advised to make his own market survey. It is suggested that an existing entrepreneur in a related line should take up the manufacture of this product. In such cases the fixed capital mentioned below will have to be suitably modified taking into account the facilities already available.

The investment needed for making 60 pieces/yr. is estimated at Rs 80,000 (fixed capital excluding the cost of land and building Rs 35,000, working capital Rs 45,000).

The terms of knowhow transfer are: Lumpsum premium ₨ 6,000; recurring royalty 3% natureof licence non-exclusive; period of licence 5 years.

## Prismatic Binocular of New Design

The Instruments Research & Development Establishment, Raipur, Dehradun has developed a new type of 7x50 prismatic binocular (Indian patent No. 141993)- device used for clear observation of distant objects. At present this type of prismatic binocular is not available indigenously. The present demand is about 5,000 units/yr.

The optical system of the binocular comprises a three-element telephoto type objective to compress its length and a 1-2-2 kapella eyepiece to cover the large apparent field of view. The porro prisms of first type are used as erectors. It contains three independent sub-assemblies (i) objective glass, (ii) prism plate carrying the graticule and (iii) circular cover plate housing the eyepiece and a silica gel dessicator. The sub-assemblies are positioned in their respective positions in an aluminium body. The body should be pressure die-cast for reduction in weight and easy tropicalization. All optics are bloomed to reduce the glare and hence to improve image contrast.

The important features of this binocular are compactness, enhanced stereo-vision and provision of filters with the eyepiece to avoid glare and haze.

The institute developed two prototypes and their performance was satisfactory. It has been approved by the Armed Forces of the country for their use.

The specifications of the product are: Magnification 7X: field of view 7 degrees.

The main raw materials/components required for its manufacture are optical glasses, aluminium, brass, optical cements, silica gel, sealing material, rubber, filter glass and plastic. All the raw materials, except filter glass, optical cement and one variety of the optical glass, are indigenously available. The equipment needed for its fabrication are optical grinding and polishing machine, edging machine, lathe, milling machine, anodizing chamber etc. All these items are indigenously available.

The cost of production works out to ₨ 1200 per unit.

It is suggested that the production should be taken up by an industry manufacturing optical instruments.

### Thermo-silico Tester

The Central Scientific Instruments Organization, Chandigarh has developed a thermo-silico tester-an instrument for indicating tne quantity of silicon present in molten cast iron. It is based on the principle of thermo-emf measurement. By knowing the silicon content present, the composition of molten metal can be suitably modified to have any desired silicon content. With its indigenous availability, it is expected to have a good demand. The tester comprises a heated probe and an electronic differential temperature controller. The drilled and sieved cast iron sample with known silicon content is put in the cavity of a copper block and the heated probe is pressed on to it with a suitably constant pressure. The total electromotive force developed by the probe is measured by a sensitive micro-voltmeter attached to the controller unit. Each sample is repeated atleast three times and the mean reading is taken. The test is repeated for 5-6 cast iron samples of different but known silicon content. These emfs are then plotted against the respective silicon contents and a statistical curve is drawn, connecting all the points. This curve is used as reference, against which an unknown cast iron sample can be tested and the silicon percentage obtained directly.

It is very useful for all types of cast iron foundries. A prototype of the device has been used in actual foundry conditions with satisfactory performance. It is suitable for grey cast iron with a silicon content of 1.5-3.5% and has an accuracy of + 5%.

A small workshop with turning, milling and grinding facilities and a small electronic production unit will be in a position to manufacture this instrument. The raw materials/components required in its manufacture are mild steel/aluminium sheets/rods, copper sheets/rods, ICs, resistances, meters, thermocouples, heater elements, etc. All the items are indigenously available.

The capital investment needed to manufacture 100 pieces of the tester is estimated at ₨ 2.4 lakhs (fixed capital excluding land and building ₨ 0.9 lakh; working capital ₨ 1.5 lakhs).

The terms of knowhow transfer are: lumpsum premium ₨ 5,000; recurring royalty 3%; nature of licence-non-exclusive; period of licence 5 years.

## PAPER AND PAPER BOARDS

### Paper Boards from Agricultural Wastes

The Regional Research Laboratory, Jammu commissioned a 0.5 tonne per shift capacity semi-automatic pilot plant for processing wood and fibre wastes into paper boards of various types for different uses. Agricultural waste materials, such as, paddy straw, pine needles, wild grasses and fibre wastes like tailor cuttings, discarded gunny bags etc., can be converted into utilizable boards like boards for book binding, boards, for packing shoes, etc., greeting cards, file covers, strong wrapping paper and hard boards.

The pilot plant consists of an automatic digester heater for pulping purposes and a continuous mechanical sheet forming unit. The manual operations involved are removal of the sheets from the sheet former and their transfer to the drier. The dried sheets are fed into calendering and trimming machines to produce the final products. Drying of the wet sheets is carried out in a tunnel type drier set up alongside the main unit.

The multipurpose pilot plant is the first of its kind particularly suitable for the utilization of unconventional raw materials and wastes for board manufacture.

It will also be used for purposes of demonstration and training of entrepreneurs interested in setting up commercial board making units. A commercial plant of 2.5 tonnes per day capacity is likely to entail an investment of ₨ 10.5 lakh. In terms of its simplicity, low cost and ease of operations, it may prove to be appropriate for establishment in the small scale sector in rural areas where raw materials like paddy straw, pine needles and other agricultural wastes are available.

## Straw Board

The National Research Development Corporation of India has developed a technology to produce straw board from straw, grass, bagasse and similar raw materials.

Straw board is widely used for making folding cartons and light-weight boxes which are used as containers for transportation and shipment of a wide range of commodities, such as, food products, consumer goods, instruments, electronic goods and light products that are to be transported from producer to consumer. Straw board is also used in making rigid boxes. These can be stacked without damage to their contents and hence are widely used for shipment and transportation purposes. Among the various types of boards available, the use of straw board in the field of packaging materials is quite substantial and it is employed in such industries as food products, pharmaceuticals, soaps and detergents, footwear, stationery, textiles and hardware.

The technology developed to produce the straw board involves dusting, chopping and cocking the fibrous raw material in a spherical digester with hydrated lime; it is under pressure raised by direct live steam. The cooked material is washed free of the dissolved material and reaches the necessary fibrous stage by being passed through a mill beater and refiner. The fibrous stock is converted into sheets at the wet-forming part of a board machine. The wet-board is pressed and dewatered at a press section and dried on a battery of cylinder dryers heated by steam. The boards are then cut to size and packed for dispatch.

The approximate cost of equipment to manufacture 300 tonnes of the product per year is about $ 150,000.

For further details contact: Mr. P. Soundararajan, Project Co-ordinator, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar-III, New Delhi - 110 024. India.

## Paper from Pineapple Fibre

A new process to produce paper and pulp from pineapple fibre has been developed by New Central Jute Mills Company at Budge Budge, Calcutta, India. Good quality printing paper, tissue paper, writing paper and newsprint can be obtained from the short fibres of pineapple which are available as waste during the extraction operation. The pulp can be derived from longer fibres.

The advantages with pineapple fibres is that they consume less of bleaching agents, being naturally of a light colour. The fibres can either be used alone or in admixture with conventional raw material like bamboo.

The fibres are extracted by decortication using a mechanical stripping device. When the process is commercially exploited, industrial units manufacturing decorticating machinery are also expected to get a fillip.

# New Machinery and Equipment

## CHEMICAL PROCESS EQUIPMENT

### Liquid Nitrogen Generator

LINIT 20 is a packaged liquid nitrogen generator with a capacity of 18 litres/hour. Manufactured to high industrial standards, the unit is of simple, but rugged design. It features only two components with moving parts:

- the air compressor, a standard-series machine of proved reliability.
- the expansion turbine, equipped with non-contacting and wear-free gas bearings.

Linit 20 is designed for automatic unattended operation. A special feature of this unit is that there is no need for defrosting. Consequently, it can be operated continuously over longer periods of time, without any loss or performance. Linit 20 is also backed up by the Sulzer world-wide engineering service and spares organization.

For details contact: Sulzer Gebruder, Sulzer, Aktiengesellschaft, CH-8401, Winterthur.

### Rotary Twin-Lobe Compressors

Rotary Twin-Lobe compressors also popularly known as Rotary blowers or roots blowers are now available upto a capacity of 10,000 $M^3$/Hr. of air and upto discharge pressure of 1kg/$cm^2$. The blowers are offered both in air cooled and water cooled type depending on the delivery pressure. They deliver oil-free compressed air and hence are suitable for many process applications in chemical industries where such air is required. The blowers have an airtight construction and can be used for compression or exhausting of corrosive or inflammable gases.

SWAM Blowers are manufactured to high engineering standards and incorporate many superior features. They are tested for performance to BS-1571.

Rotary Blowers are used in sugar and cement plants, chemicals and pharmaceutical industries, ice water treatment and sewage treatment plants and many other applications.

For further details, please write to: M/s. Swam Pneumatics Pvt. Ltd., C-2, Sector-3, Noida, Dist. Ghaziabad (UP).

### Toshniwal High Vacuum Pumps

Toshniwal high vacuum pumps cater to the needs of vacuum users in many of their applications. They are available as single and double stage rotary vacuum pumps which produce an ultimate vacuum of $10^{-2}$ and $10^{-3}$ torr respectively. The capacity of the pumps ranges from 50 litres per metre to 10,000 litre per metre. All the pumps are provided with gas ballasting arrangement to enable them to handle water vapour and condensible gases. Applications are in distillation processes, dehydration processes, freeze drying of foods and pharmaceuticals, refrigeration and air-conditioning, dairy industry etc. Another important application is as forepumps to diffusion pumps, vapour booster pumps and mechanical booster pumps.

For further details contact: Tovac Equipments, F-6, Industrial Estate, Ambattur, Madras - 600 058.

## ELECTRONICS AND ELECTRICAL EQUIPMENT

### Electronic Air/Gas Cleaners

Kirloskar Engineering has developed an electronic cleaner.

In this air filter, high retention efficiencies are obtained by greatly increasing the natural electrostatic charge of pollutants, which then pass into a plate collector system where electrostatic collection forces are maintained at a reasonable maximum for stable operation. The collected dust adheres firmly to the plates and is removed after few weeks by water cleaning.

Kirloskar electronic cleaners are meant for use in computer rooms, telephone exchanges, industrial process halls requiring control of abrasive dust, systems for protecting gas compressors, hotels and cinema halls for protection against cigarette smoke, dust and preservation of decor.

Contact: Kirloskar Engineering Private Ltd., 15/16 Kaka Halwai Industrial Estate, Parvati, Pune - 411 009.

### Paper Tape Reader Punch Combination

Data Specialities Inc., USA, manufacture LRP-300 paper tape reader/punch combination as an ASR attachment for terminal. The whisper-quiet unit allows the operator to prepare, edit or duplicate messages off line and then accurately transmit (and receive) at high speed. Transmitting is at a constant speed of 300 baud (30 CPS) instead of 30 to 50 baud which the average operator is able to maintain via key-board. The improved thoughput of data, coupled with the accuracy attained by editing the copy prior to transmission offers significant cost saving to the user.

For further information write to: General Electronics, 19/5th Floor, Tardeo Airconditioned Market, Bombay - 400 034.

### Sound Level Meters

Two new integrating sound level meters for noise and sound level measurements to type 2 standards have been developed by Bruel & Kjaer.

Designated type 2225 and type 2226, they are slim enough (only 22 mm) and light enough (350 gm) to be easily carried in the pocket. Their simple one-handed control layout enables anyone to measure noise competently after only a short familiarisation period.

Both instruments measure A-weighted levels using either slow or fast time constants, and Leq for a fixed period of 60 second from which SEL can be easily calculated. A short-term Leq eliminates the uncertainties of visually averaging a fluctuating display. In addition, type 2225 has a 'Peak hold' facility while the type 2226 has an 'Impulse' detector to international standards, and RMS Max Hold can be selected on all modes of measurements.

Fitted with a prepolarised condenser microphone, the instruments have a dynamic range from 25 dB (A) to 140 dB (A) peak with high crest factor capability. Readout is via a linear thermometer display of light emitting diodes, the entire dynamic range of the instrument being covered in only 4 attenuator steps of 40 dB, and the brightness of the LEDs is controlled automatically to be readable in any light conditions, even in direct sunlight.

Contact: Jost's Engineering Company Limited, Great Social Building, Sir Phirozechshah Mehta Road, Bombay-400 001.

## MACHINE TOOLS

### Leaf Spring Manufacturing Machine

Prakash Fabricators' hot end taper rolling leaf spring manufacturing machine consists of two complementary machines. One of them is a leaf spring rolling machine which is similar to a rolling mill, with two rollers of 12" (30-48 cm) diameter having top roll adjustment by spring-loaded screws. The bottom roll can be adjusted to suit the size of the leaf spring. This roll does the job of taper rolling of the leaf. There is also squeezing arrangement at the side of the machine and both ends of the leaves are squeezed. The rolling mill is driven by a 7.5 HP electric motor. The other machine is a shearing unit. It cuts spring steel of 16-mm maximum thickness of any length at high speed with adjustable gauges. Complete with an accentric shaft drive arrangement, the shearing unit is driven by a 5 HP electric motor. Cutting blades are made of HCHC steel and a minimum of 10,000 cuts can be had without sharpening the blades. This machine can also do the job of cutting flasts and other steel sections.

For further information write to: Prakash Fabricators Rajaram Road, P.O. Box 207, Kolhapur, Maharashtra.

## Universal Miller

Fast metal removal rates together with high accuracy and a good surface finish characterise a horizontal milling machine which is stated by its British manufacturers to remove up to 75 $cm^3$/min from components made of commercial mild steel.

The Bridgeport IS has a table measuring 1,065 mm x 225 mm and provides movements of 600 mm x 210 mm. The machine's universal format enables the table to be swivelled 45° either side of the centre and this, together with provision for a dividing head gear train drive, permits a wide variety of spiral milling operations to be undertaken. Vertical traverse is 400 mm.

The well-proportioned spindle is of a short sturdy design to give maximum torsional and bending stiffness; it is mounted in three precision bearing. The nose taper is to international standard No. 40.

A speed range of 35-1,200 rev/min is provided by all-geared transmission from the 3-kw (4 hp) main motor drive which incorporates an electro-magnetic brake. Braking occurs automatically in the event of a supply failure or if the motor current is switched off.

The machine's d.c. motor feed drive (optional for cross and vertical traverses) provides infinitely variable feed rates between 25 mm/min and 500 mm/min and rapid traverse of 2,500 mm/min. The feed is started from a directional lever mounted on the saddle. Feed rate selection through a potentiometer on the machine's pendant control enables full use to be made of the power available at the spindle. Excessive overload is prevented by a current limiter on the d.c. drive motor.

Regenerative braking of the feed drive unit provides rapid stopping in both feed and rapid traverse modes. Electrical interlocks prevent the feed being engaged until the cutter is revolving, but the rapid traverse is independent of this interlock.

An automatic backlash eliminator fitted to the longitudinal traverse is operative only during climb milling operations and is automatically relieved during conventional cutting and rapid traversing, thus minimising wear ofthe lead screw and nut.

A complete range of accessories and attachments is to be offered, including a vertical milling head, dividing and indexing quipment, vices and digital read-out facilities.

Manufacturers: Bridgeport Machines Division of Textron Ltd.
Forest Road, Leicester, England.

# Industry Roundup

This section highlights policies and procedures, guidelines, the present status and future prospects in certain industries as well as the latest available data in respect of such industries.

## ELECTRONIC CALCULATORS

### Introduction

With growing complexities in modern societies, calculators too have become more and more complex and also require the handling of larger number of figures with a high degree of accuracy. Man developed a new technique to make the work simpler, faster and productive by making Electronic Calculators. The tremendous progress in technology, especially the development of LSIs (Large Scale Integrations) and LEDs (Light Emitting Diodes) has given a great impetus to the world of Electronic Calculators. The downward trend in prices and availability of "off the shelf LSI" has indeed made possible new powerful calculating devices.

The development of Electronic Calculators in India was perhaps first taken up in 1967 at Tata Electric Companies in Bombay. In 1970, two units including Tata Electric Companies were issued letters of intent for manufacture of Electronic Calculators. Following the recommendations of the technical panel on Electronic Calculators, set up by department of Electronics, in 1972 a number of units were licensed/approved to produce Electronic Calculators. Later entrants in the field were licensed/approved with significant export commitments. The import licence that was allowed per calculator was to the extent of ₨ 400/- which was later reduced to ₨ 250/- and further cut to ₨ 150/-.

### Block Diagram & A brief description of Calculator

Other than the semi-conductor and passive components, different components to calculator manufacturing are printed circuit cards, key board and display etc. In general, a calculator consists of three major sections: Input, central processor (CPU) and the output as shown in the block diagram. The input section receives the command through key board matrix. The central processor is the heart of the calculator which stores the data

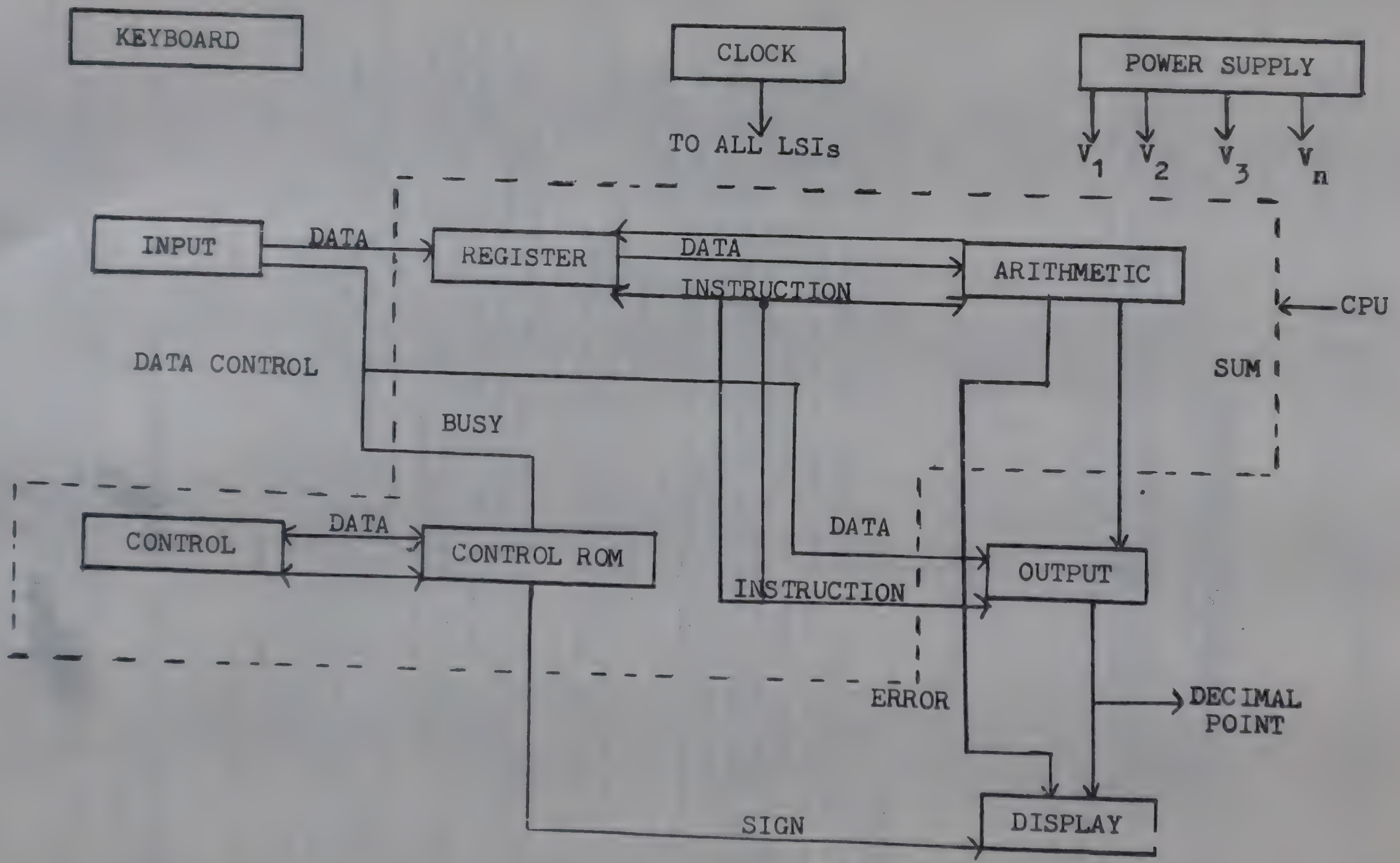
KEYBOARD
CLOCK
TO ALL LSIs
POWER SUPPLY
$V_1$
$V_2$
$V_3$
$V_n$
INPUT
DATA
REGISTER
DATA
INSTRUCTION
ARITHMETIC
CPU
DATA CONTROL
SUM
BUSY
CONTROL
DATA
CONTROL ROM
DATA
OUTPUT
INSTRUCTION
ERROR
DECIMAL POINT
SIGN
DISPLAY

FIG: BLOCK DIAGRAM OF A TYPICAL CALCULATOR and the internal control programme, makes the calculations, and provides the output section with result. The output section receives the data from the central processing unit, changes its format (decimal to binary) and shifts the level of the signals to one suitable for driving the display. A clock provides timing base, its frequency determines the rate and thus, the speed with which the calculations are performed. The micro instructions required to perform operations are provided by the semi-conductor memory.

## Current Status

These electronic calculators have shown the largest growth rate. The production of this item has increased from 20,000 numbers in 1975 to 184,000 numbers in 1979. The share of small-scale has almost remained at a level of 65 per cent during this period. About 30 units are approved for manufacturing calculators, including printer/programmable calculators, and accounting/invoicing machines. There are about 15 units in production with their output ranging from 100 to 15,000 sets per annum.

As against this licensed/approved capacity the production has been as follows:

1978-79 ----- 15,000 Nos.
1979-80 ----- 184,000 Nos.

## Marketing Opportunities & Unstable Economic Growth

According to the present production estimates more than 320 million rupees worth of calculators are expected to be produced during 1984-85 against the year 1979-80, production of calculators worth 105 million rupees. There is a tremendous potential in the next two years, which leads to lot of marketing opportunities. The various market segments of electronic calculators could be identified as below:

(a) Banks (b) Insurance Companies (c) Government account departments and other government establishments (eg. Defence Railways, Airlines etc.) (d) Commercial houses (e) Research Institutions (f) University departments (g) Private/Individuals/ Students/Executives.

The biggest challenge to the marketing today (and possible in the 1982's) is how to survive and hopefully grow in an unstable economic growth. There are many implications of unstable economic growth for marketing. More new ideas will be constantly required to tap and release latent demand in a low growth economy. The economic growth would effect the per capita income. However, a number of countervailing forces to real product innovation exist. Producers may not have confidence to predict the long term future requirement due to uncertain demand forecast. Also many of the manufacturers may not invest heavily in basic new product and R & D due to financial/economic constraints.

The calculators being produced in India may be categorised in the following according to the market demands, and the price range and approximate market share (% numbers) shown against each.

| | Approximate % Share | Price Range Inclusive of Excise Duty - ₨ |
|---|---|---|
| 1. General purpose, pocket/ hand held | 30 | 399-400 |
| 2. General purpose, desk top | 45 | 1,345-3,745 |
| 3. General purpose, printing | 9 | 3,312-5,175 |
| 4. Slide rule 8/10 digit, pocket/hand held | 16 | 1,800-2,195 |
| 5. Scientific (mostly 12/14 digit, desk top) | | 4,000-7,500 |
| 6. Statistical ( - do - ) | | 5,000-8,400 |
| 7. Financial | | 2,195-5,000 |
| 8. Programmable - Scientific/ Statistical/Financial (including hand held programmable) | | 3195-7500 |

The local prices of desk top calculators (both general purpose and others) are still high. The high prices of desk tops are partly due to high prices of local components such as the key boards and display tubes. However, the local prices of pocket/hand held general purpose calculators are not very high and there seems to be a decreasing trend in the prices of these calculators.

Hand held slide rule calculator, inspite of the chip and perhaps the keyboard for it being relatively costly, should also have been priced low since labour involved in assembly is hardly different in the two cases. That does not seem to be the case as the prices of these calculators are still high.

The present rates of excise duty (15 per cent), sales tax (15 per cent) and octoroi (2 per cent) on calculators also add significantly to the prices of calculators.

## Raw material availability and cost

Raw material availability including that of imported items and the cost of indigenous components like key units, cabinets etc., are important factors. This is vital in respect of the future price trend of calculators in the country. Mass scale indigenous production of ICs and displays would certainly help in bringing down the prices.

## Imports and Exports

The sources from where chips are imported include, electronic arrays, NEC, Hitachi, TI, GI, MOSTEK, MOS Tech., National and Rockwell. Over 35 different chip types seem to be currently in use. Since the beginning of the current financial year, the Electronics Trade and Technology Development Corporation (ETTDC) has been made the canalising agency for the import of calculator chips.

Although most of the holders of letter of intent have export obligations ranging from 30 per cent to 90 per cent of their production, none seems to have made any significant exports. With pocket calculators now being sold abroad for less than $ 10 and scientific calculators being sold for less than $ 60, exports of calculators would, no doubt, be very difficult. In fact, any export of calculators that may take place is not likely to result in increased domestic prices to offset losses but also likely to be at the cost of a net outflow of foreign exchange, unless of course, components are imported at much reduced prices which is possible only if the volume of imports is large.

## Demand Projections and R & D

The demand of electronic calculators, like many other products, would be intimately connected with the prices at which they are sold. However, considering that the production of calculators was about 150,000 in 1978-79 and about 184,000 in 1979-80, even with the prevailing prices, which are still high, it may be reasonable to expect a demand of 60,000 calculators in 1983-84. The market share for each of the calculator categories is expected to be slightly different from that in the past year due to the reduction of prices particularly that for general purpose pocket/hand held calculators.

It should be noted that with further reduction of prices (for scope exists) the demand figures can go up. And it is possible to reduce the calculator prices by purchasing the components in bulk. However, the factors like (i) total demand of calculators and thereby the number of chips (ii) the large diversity in the calculator models or the chip types used as a result of keen competition (iii) high prices of locally available components and (iv) local tax structure have to be considered before a substantial reduction in the prices of calculators can be expected.

## Research & Development (R & D)

The development of the programmable desk calculator calls for more intricate system, logic and hardware design as well as design and development of special items. This is an area where the task can be entrusted to R & D laboratories and knowhow developed transferred to the industry. In order to meet the requirement of this type of calculator almost all hardware items have to be imported initially. Various types of electronic desk calculators are designed and developed by CSIO, NAL and BEL respectively. NAL is in the process of releasing knowhow on 3 simpler machines for commercial use which are being derived from the sophisticated scientific machine by 'shedding' the superfluous circuitry. BEL has in hand a programme of development of desk calculators for business and scientific use. BEL will be undertaking the development of more complex and advanced programmable calculators for use in educational and scientific institutions. Apart from these three organisations, TIFR also developed a calculator and a descrete technology model has been successfully developed at the BARC. Currently an IC version of the same unit is under development and expected to be ready within the few months. Arrangements have been already made for productionising this unit at ECIL.

Tabular forms presenting various aspects of calculators are given below:

(i) The production of Calculators in numbers from 1974 to 1980

| Year | Production in Nos. |
|---|---|
| 1974-75 | 10,000 |
| 1975-76 | 20,000 |
| 1976-77 | 65,000 |
| 1977-78 | 76,000 |
| 1978-79 | 150,000 |
| 1979-80 | 184,000 |

## (ii) Calculator Capacity and Production in Major Industries during 1976, 77 and 78

| Year | Accounting Unit | No. of units | Installed Capacity | Production | |
|---|---|---|---|---|---|
| | | | | Quantity (Nos.) | Value (₨ in lakhs) |
| 1976 | ₨ lakhs | 7 | 28,500 | 24,470 | 418 |
| 1977 | ₨ lakhs | 8 | 30,500 | 29,300 | 425 |
| 1978 | ₨ lakhs | 6 | 90,000 | 29,870 | 841 |

## (iii) Growth in the production of consumer electronic products (Calculators)

(Qty. in million Nos. except when otherwise specified and value in ₨ million in brackets)

| Actual Production | Estimated Future Production | |
|---|---|---|
| 1978-79 | 1983-84 | 1988-89 |
| 0.5<br>(76) | 0.60<br>(220) | 1.50<br>(550) |

## (iv) Growth of Share of Small Scale Sector in the Consumer Electronics Production

(in thousand numbers)

| 1975 | | 1979 | |
|---|---|---|---|
| Total | Small Scale | Total | Small Scale |
| 20 | 10 | 184 | 120 |

## (v) Calculator Production Estimates During 1984-85

(₨ in millions)

| 1979-80 (Actual) | 1984-85 (Targets) | Growth Rate (Percentage) |
|---|---|---|
| 105 | 820 | 25.0 |

### (vi) LSI Calculator Production Estimate for 1983-84

| Quantity (in million Nos.) | Value (in ₨ million) |
|---|---|
| 0.3 | 8.00 |

### (vii) Current Excise Duty Structure (1980-81)*

| Sl. No. | Item | Sector |  |
|---|---|---|---|
|  |  | Small Scale | Organised |
| 1. | Calculators (other than slide calculating machine of value not exceeding ₨ 175 each | 10% | 10% |
| 2. | Slide rule calculating machines of a value not exceeding ₨ 450 each | 10% | 10% |
| 3. | Others | 20% | 20% |

* An additional special duty equivalent to 1/20th of the above normal duty rates is levied on all items.

### (viii) Calculator Exports During 1978 and 1979

|  | (₨ in millions) |
|---|---|
| 1978 | 0.7 |
| 1979 | 0.5 |

(ix) Calculator imports during 1977, 1978 and 1979

| Year | Type of Calculator | USA | UK | FRG | HOLLAND | JAPAN | ITALY | USSR | FRANCE | Others | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1977 | 1. Desk Calculators | - | - | - | - | 8 | - | - | - | - | 8 |
| | 2. Pocket Calculators | - | - | - | - | - | - | - | - | - | - |
| | 3. Printing Calculators | - | - | - | - | 1 | - | - | - | - | 1 |
| | 4. Calculator Parts | - | - | - | - | 146 | - | - | - | - | 146 |
| | 5. Electronic Calculators | 8 | 2 | - | - | 3 | - | - | - | 16 | 29 |
| 1978 | 1. Pocket Calculators | 4 | - | - | - | - | - | - | - | 3 | 7 |
| | 2. Calculator Parts | - | - | - | - | 500 | - | - | - | 271 | 771 |
| | 3. Electronic Calculators (NES) | 14 | - | - | - | 6 | - | - | - | 6 | 26 |
| 1979 | 1. Pocket Calculators | 11 | - | - | - | - | - | - | - | - | 11 |
| | 2. Printing Calculators | - | - | - | - | 3 | - | - | - | - | 3 |
| | 3. Calculator Parts | 89 | - | - | - | 2032 | - | - | - | 1074 | 3195 |
| | 4. Electronic Calculators (NES) | 2 | - | 2 | - | 3 | - | - | - | 4 | 11 |

(VVR)

# Current Technical Literature

Copies of articles/documents listed in this section are available on payment of ₨ 5/- for the first 5 pages or part thereof and Re 1/- for every subsequent page of the photo copy or xerox copy of the article/document. While placing the order, please mention the CTL number of the SENDOC Bulletin

| Subject Index | CTL Nos. |
|---|---|
| Chemical Industries | 541-547 |
| Leather Industry | 574-578 |
| Paper Pulp and Its Products | 538-540 |
| Perfumes Cosmetics & Toiletries | 552-558 |
| Plastics | 569-573 |
| Rural Industrialisation | 521-526 |
| Small Industry | 527-532 |
| Soaps and Detergents | 548-551 |
| Surface Coatings | 559-568 |
| Technology Transfer | 533-537 |

# CURRENT TECHNICAL LITERATURE

## SCIENCE AND TECHNOLOGY

### Rural Industrialisation

521. -----: Impressions and recommendations of the review committee on Karimnagar Project. Invention Intelligence, 1979, 14(10), 417-418.

522. -----: List of technologies available with NRDC-India for exploitation in rural areas. Invention Intelligence, 1979, 14(10), 422-424.

Processes available are grouped under: Agrobased industries, Building materials, Chemical industries, Drugs and pharmaceuticals, Domestic appliances for mass consumption, Village pottery, Leather chemicals, Energy utilisation, Food industries, Mechanical industries, Post-Harvest technology, Textile industries, Water purification, Waste utilization etc.

523. -----: Resources inventory and plan of action for development of rural/backward areas. Invention Intelligence, 1979, 14(10), 419-421.

Presents a draft outline for a survey of the inventory of resources, infrastructure and the linked issues involved in the preparation of an Action Plan for development of a rural/backward area. (JBS)

524. JHA, S·S.: Industrialization of rural areas in India: a note on social implications. Indian Chemical Journal, 1979, 13, Annual Supplement 13-17.

An attempt has been made to identify some of the problems ensuring the programme of industrialization of our rural areas.

525. SWAMINATHAN, M.S et al: Management of natural resources for rural development - A 'Pen-Seminar' on Experiment Karimnagar. Invention Intelligence, 1979, 14(10), 384-417.

Resources in rural India are still unexplored and underutilized. For proper exploitation and management it is most essential to identify and obtain tolerably accurate data on the available resources and information on matching cost-effective appropriate technologies to be made available quickly enough, to the decision makers and implementing agencies. The glaring weakness of the Karimnagar experiment was the absence of a suitable agency for implementing the knowhow available and other casualities were motivation enthusiasm, missionary spirit and sense of participation in a project of such magnitude. (JBS)

526. SWAMINATHAN, C.G. & LAL, N.B.: Appropriate technologies for rural road development. Research and Industry, 1981, 26(1), 17-31.

In the context of extensive rural road development programmes in India, the Central Road Research Institute (CRRI), New Delhi, surveyed 285 sections of 175 rural roads spread over nine states of the country and collected and analysed a wide range of data. Based on the results of the analysis of data, the Institute had evolved appropriate technologies for rural road construction and rural road construction equipment. These include: The categorization of rural roads based on serviceability levels, evolution of "Traffic Index" for incorporation of solid-wheeled cart traffic in the designing of rural roads, development of a simple and workable 'Strength Index' for evaluating subgrade strength, provision of design curves for two categories of rural road based on Traffic and Strength Indices, development of low-cost, labour-intensive construction techniques, development of short-term and long-term maintenance practices, and fabrication of animal-drawn road-rollers and water bowsers for rural road construction.

## Small Industry

527. -----: How commercial banks provide credit facilities to exporters. Leathers, 1980, 21(7-8), 3-9.

528. -----: Small scale industry - some basic organisational issues. Chemisphere, 1981, 5(32), 32-34.

Highlights the problems of small scale industry in the areas of marketing and raw material procurement, due to unorganised structure of the sector. Envisages an organisational structure which can cater to the needs of the industry and specifies the conditions required for proper function of envisaged structure. (MSR)

529. -----: Small-scale units in sick bed. Chemical Weekly, 1980, 26(9), 56-57.

Highlights the causes for the sickness for small industries in A.P and suggests some remedies to prevent sickness. (MSR)

530. -----: Small sick units to get budgetary fund. Chemical Weekly, 1981, 26(22), 61-62.

Describes the margin money assistance scheme to assist the small sick units in the country. According to the scheme, ₨ 10 to 20,000 will be provided by the central government which will be recovered in 9 years including the moratorium period at 5.5% interest. (MSR)

531. ANANTHANARAYAN: Management expertise for small scale unit. Chemisphere, 1980, 5(25), 24-25.

Discusses the role of small scale sector in developing economy. Reviews the management education in India and highlights the deficiencies. Suggests application of modern management techniques in small scale sector to avoid sickness in this sector. (MSR)

532. ASMUSSEN, T.: Enhanced productivity in the small scale sector. Lexport Bulletin, 1980, 3(5), 27-38.

Discusses the elements and measurement of productivity in the small scale sectors.

## Technology Transfer

533. -----: Foreign technical/financial collaborations. Chemical Take-Off, 1980, Annual Number, 9(10) 89-97.

List of foreign collaborations during 1979 along with the foreign & Indian Companies involved and the items of manufacture is given. (MSR)

534. ELLIOTT, D.D.: The technology transfer tangle. Leading Edge, 1980, 10-13.

As the originator and source of high technology in past decades, the United States has a big stake in technology transfer, compounded by such factors as mutual security, detente and political considerations.

535. SIDHU, G.S.: Role of technology transfer in the developmental mechanism. Invention Intelligence, 1980, 15(10-12), 448-452.

The hardest job in transferring R & D results for creating a new industry is putting up the first running plant. In this context, setting up of 'demonstration-cum-replication units on selected developmental technologies would go a long way in making an avalanche impact through a multiplier effect.

536. WEBB, S.: Intermediate technology that really works. Invention Intelligence, 1981, 16(2), 77-79.

Intermediate technology means the application of equipment cheap and simple enough to allow villagers in developing countries to set up new industries and raise their standards of living without moving into towns. There are many pitfalls, including failure to take account of social customs or religious practices and a tendency to give people what idealists think they ought to have rather than that they want. But there are many imaginative projects under way that promise to be highly successful. Some of the projects like hand spinning machine, paper making machine for tropical plant wastes, candle making, corrugated roof sheets from human hair clippings etc. with which Intermediate Technology Industrial Services, UK, is associated, are described.

537. WESTFALL, G.R.: Selling technology to the third world. Leading Edge, 1980, 14-17.

Based on the early experiences with industrialisation in Mexico and India and the inequities that developed in the contractual stipulations, most developing countries regulate the inflow of technology through a legal machinery. The new framework of technology transfer codes aim at: retaining majority ownership and limiting repatriation of profits, attracting preferred technologies, acquiring industrial knowhow, utilising local resources, stimulating trade and economic growth and preventing exploitation of licensees. (JBS)

## PAPER, PULP AND ITS PRODUCTS

538. GREEN, G.J.: Functional paper properties in xerography. TAPPI, 1981, 64(5), 79-81.

Paper properties important in functional xerographic papers include stiffness, smoothness, electrical resistivity, porosity, coefficient of friction, and moisture content. Some properties are important to print quality while others affect paper handling reliability. Particular subsystem design features also determine which properties are important. Paper handling reliability and lower background are obtained with rougher papers. Increasing resistivity improves density but also increases the tendency to cause static, higher background and toner movement. Specific requirements of machines should be developed between paper manufacturer, user, and machine manufacturer.

539. ROY, A.K.: Lignin - a challenge for future scientific research. Indian Pulp & Paper, 1980, 35(1), 5-8.

540. SADAWARTE, N.S.: Extensible paper: an innovative aid to packaging. Invention Intelligence, 1980, 15(10-12), 478-479, 486.

Paper bags would perform well if the paper used can extend itself and stretch to withstand pressure. The ability of extensible paper to stretch, its advantages and role in packaging are discussed. (JBS)

## CHEMICAL INDUSTRIES

541. -----: Facts & figures for chemical R & D. Chemical & Engineering News, 1980, 58(30), 37-73.

Research and development outlays in US economy have been increasing at an annual rate of 11% from $ 54.3 billions in 1979 to $ 60.4 billions in 1980, supporting some 660,000 scientists and engineers and sharing 2.3% of GNP. A compilation of key data on funding agencies, spending by chemical companies, universities and colleges, graduate school students in science etc. is presented. (JBS)

542. -----: Textile auxiliary industry in India: a survey. The Chemical & Polymer Times, 1980, 9(10), 5.

Brings out the historical development of the textile auxiliary industry in India and presents the production/demand statistics for the years 1974-75 & 78-79. Tabulates the projected demand of the textile auxiliaries for the yar 1983-84 and the raw materials required for the years 1978-79 and 1983-84. (MSR)

543. GUDSOORKAR, V.R.: Polyvinyl alcohol. Pharmatimes, 1980, 12(10), 21,23, 24.

Discusses the manufacture, properties and applications of polyvinyl alcohol. (MSR)

544. HUSSIEN, M & ZATOVT, A.A.: Recovery of ferrous sulfate heptahydrate from spent liquor by addition of ethyl alcohol. Chemicals and Petrochemicals Journal, 1980, 11(11), 13-16.

Discusses the crystallisation of ferrous sulfate heptahydrate from spent liquor and conditions required for crystallization. (MSR)

545. MEHTA, J.J.: Hazards in chemical industry. Chemisphere, 1980, 5(31), 33-37.

Discusses the problems of hazardous health conditions at workplaces in chemical industries. Identifies the role of various factors that influence the hazards. (MSR)

546. ROBERTSON, M.M.: An in-line system for printing ink manufacture. Polymers Paint and Colour Journal, 1979, 169(4005), 711-712.

547. SINGAL, R.K.: Design of a chemical laboratory. Chemicals & Petrochemicals Journal, 1980, 11(9),17-18.

Discusses various aspects that are to be considered while designing a chemical laboratory. (MSR)

## SOAPS AND DETERGENTS

548. -----: Soap industry: let large and small units grow together. The Oils & Oilseeds Journal, 1980, 37(1),4-5.

Reviews the status of the soap industry.

549. -----: Survey of soap units in small sector in Maharashtra. Small Industry Business Today, 1980, 1(10), 12-13.

Examines the findings of survey of the small scale soap manufacturers of Maharashtra undertaken by M/s. Godrej Limited on behalf of Indian Soap & Toiletries Makers' Association in 1976.

550. MILWIDSKY, B.: Soap technology. 10. Manufacture of syndets - practical aspects. Household & Personal Products Industry, 1980, 17(8), 52-54, 56 & 77.

551. OSTEROTH, D.: Transparent soaps. Soap Cosmetics Chemical Specialities, 1980, 56(10), 33-36 & 74.

Reviews the transparent soap literature.

## PERFUMES, COSMETICS & TOILETRIES

552. BEHARILAL, S.: A perspective of the perfumes & flavours industry in India. Soaps, Detergents & Toiletries Review, 1981, 11(1), 24-25.

553. GUPTA, B.R.S.: Export of cosmetics and toiletries: Vast untapped potential. Eastern Economist, 1980, 75(3), 247-248.

According to a market survey there is a vast potential for the export of cosmetics and toiletries. The author believes that these exports can reach ₨ 150 crores by 1981-82 and can exceed ₨ 630 crores by 1990 provided arrangements are made for increased production through such synthetic inputs as musk ketones, cinnamic alcohols and esters.

554. JACOBSEN, M.: The hair care market. Household & Personal Products Industry, 1980, 17(11), 64-66, 68, 70, 72 & 75.

555. JACOBSEN, M.: Skin treatment products. Household & Personal Products Industry, 1980, 17(8), 26-28, 30 & 33.

556. PROSERPIO, G.: Baby cosmetics: technical advances. Soaps, Detergents & Toiletries Review, 1981, 11(2), 25-27 & 30.

Discusses developments in different ranges of baby cosmetics.

557. RUSS, J.: Cream nail preparations. Soaps, Detergents & Toiletries Review, 1980, 10(8), 22-24.

Gives some of the formulations for nail preparations using different materials. (BS)

558. SITARAM, V.: Perfumes and the world trade. Soaps, Detergents & Toiletries Review, 1981, 11(1), 28-29.

Discusses the details of raw materials for perfumes, production and exports of perfumes. (BS)

## SURFACE COATINGS

559. -----: Developments in adhesives. Paint Manufacture, 1980, 50(4), 7-8, 10, 12 & 14.

Highlights some of the more recent advances in adhesive technology including the basic raw materials that could influence developments in adhesive systems over the next few years.

560. -----: Linseed oil. Paintindia, 1980, 30(2), 22-24, 27.

Gives the typical characteristics of linseed oil, the fatty acid composition of linseed oil, raw materials required and the manufacturing process of linseed oil, application and end uses. (KSDR)

561. -----: Raising the performance level of industrial floor polishes. Resin Review, 1980, 30(1), 9-16.

Rhoplex B-1604, a new product from Rohm and Hass Company, represents a major advance in floor polish polymers. It enables manufacturers of industrial floor polishes to formulate products that provide both exceptional gloss and durability.

562. BUDMAN, M.: Gilsonite resin and the paint industry. American Paint and Coatings Journal, 1980, 65(3), 55-58 & 60.

Highlights the properties and uses of gilsonite.(KSDR)

563. CARSON, H.C.: The wax and polish market. Household & Personal Products Industry, 1980, 17(9), 40, 42.

564. HAMMOND, H.K. & GOLDMAN, R.I.: Evaluating coatings. Modern Paint & Coatings, 1980, 70(5), 57-59.

Instruments for testing paints and coatings systems can be grouped into two categories: (1) appearance evaluation and (2) physical testing and viscosity. The instruments and the tests are briefly described.

565. HOWARD, J.P.: Marketing research in the paint industry. Paintindia, 1980, 30(1), 9-11.

Highlights the types of marketing research, the importance of secondary research, advantages of independent research, the results of marketing research and the future of marketing research for the paint industry. (KSDR)

566. MEHTA, S.M.: Past, present and future potentials of rosin & turpentine industry. Paintindia, 1980, 30(1), 3-6.

Gives the estimated production of oleo-resin gum, rosin and turpentine during 1971-72 to 1978-79; estimated state-wise production of oleo-resin-gum during 1971-72 to 1978-79, assessment of raw material requirement. (KSDR)

567. SMITH, C.A.: Flame resistant and intumescent paints. Part 1. Paint Manufacture, 1980, 50(5), 24-25, 27.

Describes the various roles that coatings can play in a fire and discusses the tests and standards in current use followed by the physical and chemical roles of pigments.

568. TIPPETT, J.P.: Selecting dispersion equipment. Modern Paint and Coatings, 1980, 70(5), 52-53.

Indicates the salient features of the dispersion equipment selection process. (KSDR)

## PLASTICS

569. -----: Bonded-fluoropolymer coating. (Technical file No. 84). Engineering, 1980, 220(12), I-IV.

Developments in resin technology and formulation have made it possible to produce bonded-fluoropolymer coatings with considerably improved lubricating and wear properties. Explains how it is now possible to design a coating for almost any combination of required properties.

570. -----: Linear low-density polyethylene set to capture large share of plastics market. Chemical Weekly, 1981, 26(20), 101-103.

Examines the state of the art in linear low-density polyethylene. Surveys the investment plans of present and potential LLDPE producers. (MSR)

571. -----: Role of plastics industry in India. Chemical Weekly, 1981, 26(13), 84-85.

Explains the role of plastics in daily life and in packaging industry. (MSR)

572. HONAVAR, M.M.: Tropothen-X cross-linked polyethylene cables. Plastirama, 1980, 11(5), 6-10.

Properties and some salient operational characteristics of cross-linked polyethylene cables are highlighted. (KSDR)

573. SHARMA, G. & AHUJA, G.: Polyurethane : A versatile polymer. Chemicals & Petrochemicals Journal, 1981, 12(2), 31-35.

Discusses the synthesis and applications of polyurethanes. (BS)

## LEATHER INDUSTRY

574. DATTA, D.C. & NATH, S.K.: Standardisation of export data. Lexport Bulletin, 1981, 3(7), 62-66.

Examines the need for standardisation of export documentation and gives the export statistics of leather and leather goods for the years 1976-77, 1977-78 and 1978-79. (BS)

575. MAHADEVAN, T.S.K.: Technology transfer to leather and allied industries in the eighties. Leather Processing, 1981, 4(8), 19-20.

576. SOUNDARARAJAN, P.: Technology transfer in leather and leather products - An Indian experience. Research and Industry, 1981, 26(1), 12-16.

Leather technologies developed by the Central Leather Research Institute, Madras and transferred to industry by the National Research Development Corporation of India, New Delhi, are discussed. The problems involved in the horizontal transfer of these technologies are identified and solutions for tackling them are also suggested.

577. SRINIVASAN, M.R.: The problem of raw hides and skins. Leather Markets, 1981, 10(7), 9-10.

578. VENKATACHALAM, P.S. et al: New approach to leather with minimum chrome. Leather Processing, 1981, 4(7), 19-20.

It has become necessary to reduce/eliminate the use of chrome in tanning condition as well as using minimum chrome to produce leather with shrinkpractice. Attempts have been made to study the combination tannages involving aluminium sulphate, certain dialdehydes and vegetable tannins under appropriate age temperature of more than 100°C. Physical testing data of these leathers have also been compiled. (AA)

# SENDOC Services

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| 4. | Ent. - Gujarat | Profiles on: Paper industry, Electric switches, Fire bricks. |
| 5. | Ent. - Himachal Pradesh | Profile on: Super enamelled copper wires. |
| 6. | Ent. - Karnataka | Profiles on: Biscuit making, Aluminium stearate, Calcium stearate, Calcium carbide, Maize starch, Dall mill. |
| 7. | Ent. - Madhya Pradesh | Profile on: Tarpauline. |

| S.No. | Enquirer | Services Rendered |
|---|---|---|
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| 9. | Ent. - Orissa | Profiles on: Straw-board, Welding electrodes, Regeneration of engine oil, Mushroom cultivation. |
| 10. | Ent. - Tamil Nadu | Profiles on: Potassium silicate, Oxalic acid, Tamarind kernal powder. |
| 11. | Ent. - Uttar Pradesh | Profile on: Cold Storage, Rice bran oil |

Note: Ent. - Entrepreneur.

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# New Products and Processes

## CHEMICAL INDUSTRIES

### Carboxy Methyl Starch

Starch is extensively employed in the textile industry for sizing, printing and finishing. Starch however, suffers from some serious inherent drawbacks:

a) It has to be cooked for a long duration before a workable paste is obtained.

b) From its solution/paste, starch precipitates out on keeping, thereby adversely affecting the suitability of the solution/paste.

The above drawbacks hinder its use in desizing. Investigations to modify starch to remove the drawbacks were undertaken at the Sri Ram Institute for Industrial Research, 19, University Road, New Delhi-110 007, and a new product carboxy methyl starch(CMS) has been developed. CMS obtained by the process is water soluble and has a minimum degree of substitution of 0.15 to suit the requirement of the consumers.

CMS can successfully replace theimported gum tragacanth in printing. It is found that a partial replacement of sizes such as polyvinyl alcohol by CMS in sizing of synthetic yarn and their blends is also possible. CMS may find application in preparation of adhesives too. Apart from the major consumption expected in the textile field, it may find use in paper sizing, detergents, petroleum drilling fluids, agricultural insecticides and edible jellies.

CMS is prepared essentially by the reaction of monochloroacetic acid (MCA) or its sodium salt with starch in the presence of alkali. As per the process developed at the Institute, starch is suspended in alcohol to which calculated amount of caustic soda and MCA are added. The whole mass is heated for 2-4 hours and after the reaction is over, the mass is neutralised with acid and centrifuged to get the product, which is dried. The liquor from the centrifuge is distilled to recover alcohol for recycle. The process is covered by the Indian Patent No.99657 of 1965.

The work on the process has been carried out on a bench scale of 5 kg of CMS per batch.

The main raw materials required are starch, monochloroacetic acid, caustic soda, ethyl alcohol (commercial) and sulphuric acid. All these are readily available in the country. The items of equipment required are mainly jacketted reaction vessel, storage tanks, centrifuge, drier, grinder, pumps etc.

It is estimated that a plant capable of producing 300 tonnes of CMS per annum, would need an investment of ₨ 0.25 million, excluding land and buildings. The plant can provide employment for about 20 persons. The process has been licensed to two parties, one of which is in production.

## Silica Gel

Silica gel is a partially dehydrated form of polymerised colloidal silica. It is a stable product, hard, translucent and granular. Silica gel finds a variety of applications. Important among these are: i) drying of air and other gases in systems which are either static or dynamic with respect to gas movement, ii) drying of organic compounds in liquid phase, iii) dehydrated packaging of materials, iv) separation of gases in petroleum refining, v) manufacture of coatings, and vi) as a supporter of catalysts.

A process to manufacture silica gel overcoming some of the shortcomings of the conventional processes has been developed at the Regional Research Laboratory (Council of Scientific & Industrial Research) Jorhat-785 006, Assam.

The process developed is simple and does not require elaborate arrangement like dialysis for removal of electrolytes. The gel obtained is of high purity and can therefore be utilised not only as desiccant but also for separation of gases. The gelification of the sol does not require raising the concentration by heat treatment. Because of simplicity of operation, the cost of production is low. The gel produced using the process has a purity of 99 percent and can be utilised for chromatography and other special purposes. The bulk density of the gel is 0.48 kg per litre(size; -7+14 BSS, 89.56%). The absorption capacity of the gel is 42 to 44% at 90-95% relative humidity as compared to 36% in the case of gel produced by conventional processes.

In the improved process, the viscous solution of sodium silicate containing suitable alkali silica ratio is diluted with deionised water. The diluted solution is then filtered and stored. To obtain silica gel the filtered solution is percolated through a bed of cation exchanger of strongly acidic type and then through a bed of anion exchanger. While percolation is carried out in one column, regeneration is effected simultaneously in the other columns. The silica gel thus obtained is then dried on trays. The hardened gel is finally dried (6-10 percent moisture) in an electric oven and then packed.

The process has been developed on bench scale and has been successfully commercialised.

The main raw materials required for the process are sodium silicate, sulphuric acid, caustic soda and ion exchange resins. All these are indigenously available. The items of equipment required are ion exchange columns, tray driers, electric drying oven, deioniser, pumps, storage tanks and vessels. All these can be procured indigenously.

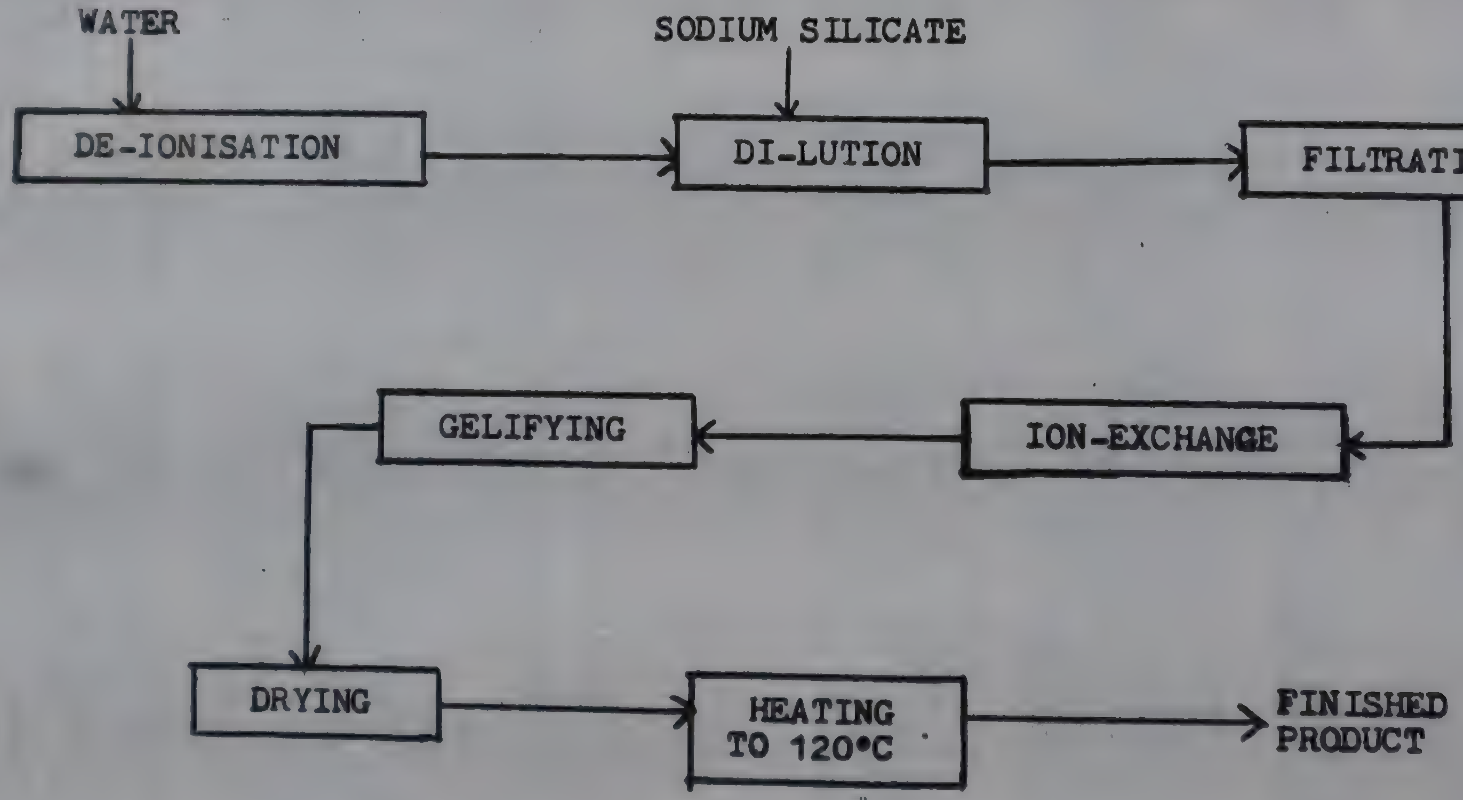
The investment required for a plant having a capacity to produce 50 tonnes of silica gel per year is estimated at ₨ 0.4 million, excluding land and buildings. A plant of the above size has a potential to employ about 15 persons. The process has been released to six parties, and two of them are in production.

## Sodium Alginate from Indian Seaweeds

Alginic acid, an important seaweed colloid, finds applications in many industries. Its sodium salt viz. sodium alginate is used as a stabliser in ice-creams, milk suspensions and fruit-squashes. It imparts smooth texture to ice-creams and prevents its coarsening during storage. It is also used as thickening or jelling agent for jams, sauces, fruit jellies and custards. It is largely used in screen printing of textiles and is an important component in dental impressions, hair creams and lotions. Alginic acid is extracted from the seaweed sargassum which grows along the coasts of Saurashtra and South India.

Dried sargassum seaweed is pulverised and treated with hydrochloric acid at the desired temperature. The mass is washed with water and extracted with sodium carbonate solution to form sodium alginate. The solution containing sodium alginate is bleached with sodium hypochlorite. The bleached solution is run into rectified spirit when sodium alginate coagulates. This is then washed with alcohol, filtered and dried.

# BLOCK FLOW DIAGRAM FOR SILICA GEL


WATER
DE-IONISATION
SODIUM SILICATE
DI-LUTION
FILTRATION
ION-EXCHANGE
GELIFYING
DRYING
HEATING TO 120°C
FINISHED PRODUCT

The Central Salt & Marine Chemicals Research Institute (Council of Scientific and Industrial Research), Bhavnagar-364 002 has studied the process on a pilot plant having a capacity of 10 kg of product per day.

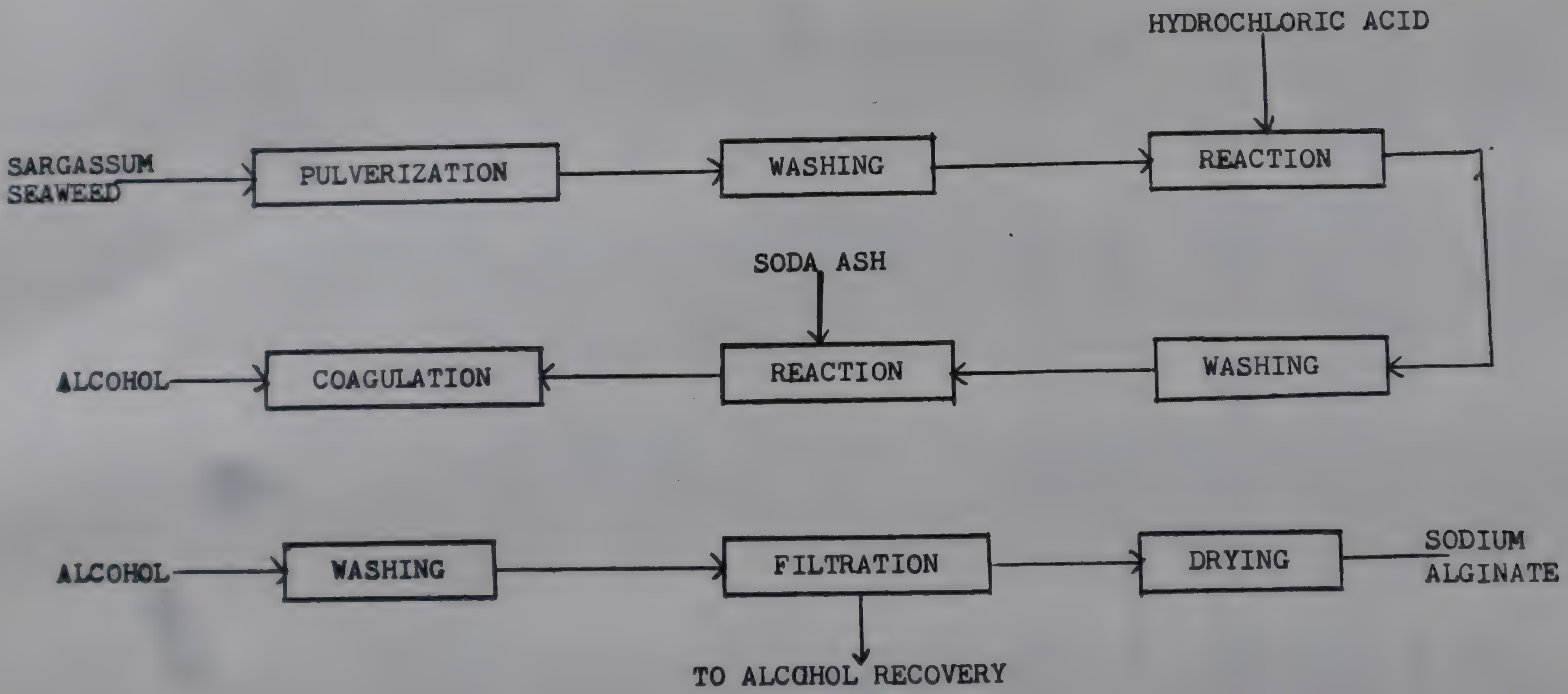
Seaweeds, rectified spirit, hydrochloric acid, soda ash, sodium hypochlorite are the main raw materials required in the process. The items of equipment required include reaction vessel drier, filtration unit, storage tanks etc. All these are available in the country.

It is estimated that a plant having a capacity of 60 tonnes of alginate per annum will cost ₨ 1.0 million, excluding land and buildings.

The plant has a potential to provide employment for about 50 persons.

The process has been licensed to six parties, who have yet to go into production.

## BLOCK FLOW DIAGRAM FOR SODIUM ALGINATE


HYDROCHLORIC ACID
SARGASSUM SEAWEED
PULVERIZATION
WASHING
REACTION
SODA ASH
ALCOHOL
COAGULATION
REACTION
WASHING
ALCOHOL
WASHING
FILTRATION
DRYING
SODIUM ALGINATE
TO ALCOHOL RECOVERY

# ELECTRONICS AND ELECTRICAL INDUSTRIES

## Cinema Arc Carbons

For projecting a movie on the screen, high intensity illumination is required which is obtained by striking an arc between two carbon electrodes. The National Physical Laboratory (Council of Scientific & Industrial Research), New Delhi-110 022, has developed technology for the manufacture of carbon electrodes. This technology can be used easily in the small scale sector. Small scale units can supply arc carbons to an area covering about 100 to 200 picture halls. There is a good demand for cinema arc carbons, since India is one of the large producers of motion pictures.

The cinema arc electrode consists of an inner part-the core and an outer part-the shell. The raw materials for the core and the shell are processed separately and later both the core and the shell parts of the electrode are extruded simultaneously. In this way, this process differs from the other commercial processes for production of cinema arc electrodes.

For the preparation of the core, calcined petroleum coke a binder of tar and pitch, rare earth salts and graphite are used. Petroleum coke, carbon black, anthracene oil, tar and pitch are used for the shell part of the electrode. Shell and core materials are mixed separately with binder and composite slugs are made in a slug press. The composite slug is then extruded in an extrusion press leading to green carbons of desired cross-section and composition. The green carbons are then further cut to the desired length and baked in furnaces. The baked carbons are copper-plated and polished.

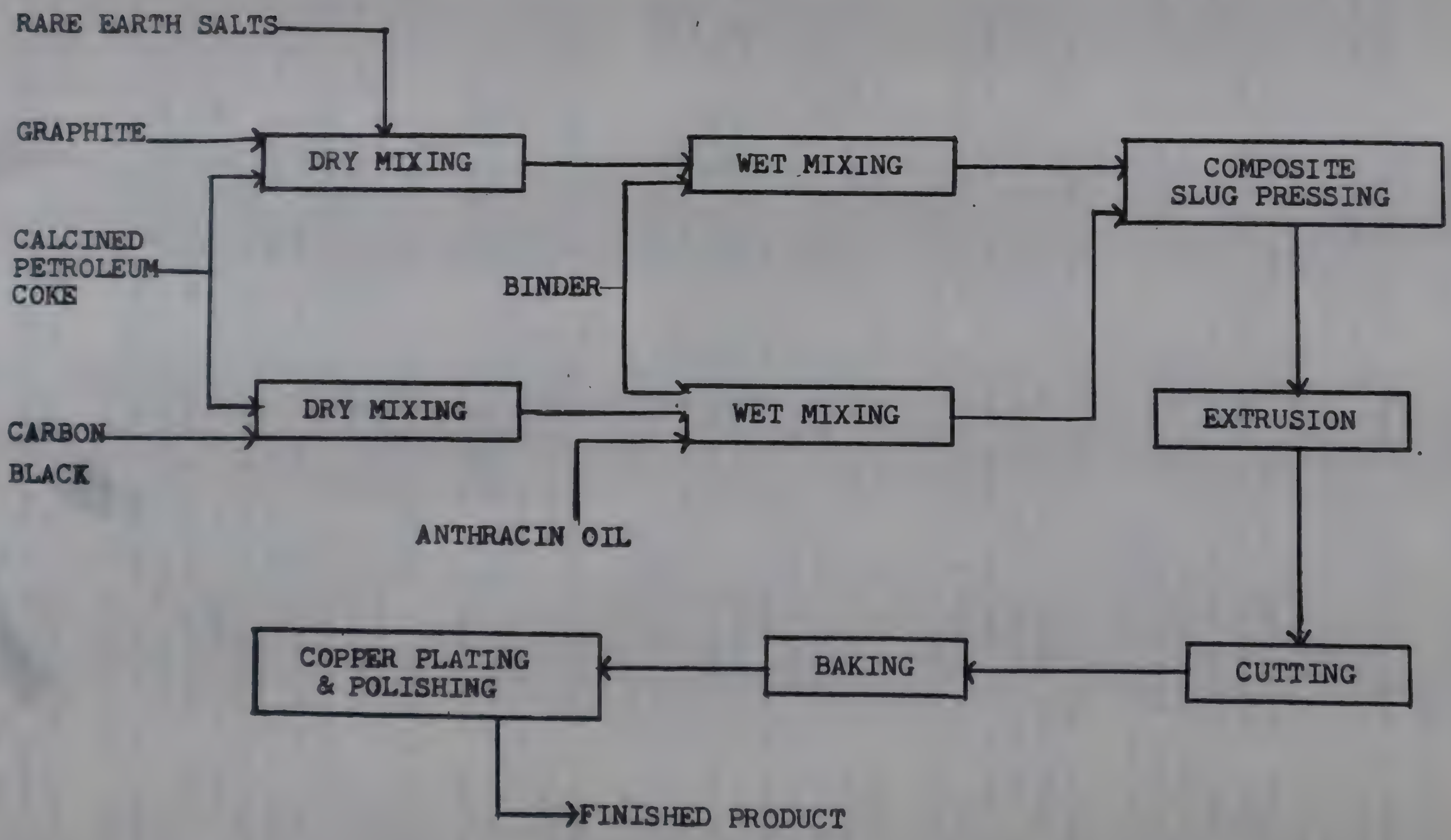
The cinema arc carbons have been produced by the Laboratory on a semi commercial scale. Carbons worth about Rs 0.5 million have been sold to various consumers within the last-5-7 years. Consumer acceptability reports indicate that the performance of these carbons is comparable with that of imported ones.

The main raw materials needed for the manufacture are petroleum coke, carbon black, coaltar pitch, rare earth salts, and sulphuric acid. All these are available indigenously. The main items of equipment required are jaw crusher, pulverizer, edge runner, conical mixer, sintering furnace, oven, sieve shaker, sigma blade mixer, roll mixer, slug press, extrusion press, cutting machine, baking furnace, polishing machine, electroplating tank, arc lamp, X-ray testing machine, tip grinding machine, brand marking machine, boiler, magnetic separator, rectifier. All these are indigenously available. Besides these, some laboratory and handling equipment are necessary for general functioning of the plant.

A plant having a capacity to produce one million pairs of carbons per annum, would need an investmentof Rs 1.5 million, excluding land and buildings.

The facility has a potential to provide employment for 40 persons. The process has been licensed to a number of parties and four of them are already in production.

## BLOCK FLOW DIAGRAM FOR CINEMA ARC CARBONS


RARE EARTH SALTS
GRAPHITE
CALCINED PETROLEUM COKE
CARBON BLACK
DRY MIXING
DRY MIXING
BINDER
ANTHRACIN OIL
WET MIXING
WET MIXING
COMPOSITE SLUG PRESSING
EXTRUSION
CUTTING
BAKING
COPPER PLATING & POLISHING
FINISHED PRODUCT

## DC Motor Controller

A DC motor controller finds application in machine tool industry, precision mechanical drive applications in the industry and in electro-chemical industries. DC motor controller using thyristor semi-conductor has been developed at the National Aeronatucal Laboratory, Council of Scientific and Industrial Research, Bangalore-560 017, for motors upto 10 HP. The design allows the controller to be used for all types of DC motors-series, shunt, compound etc. The cost of the controller developed, is lower than the cost of similar foreign models.

The main features of the controller are:

i) dual three phase thyristor bridge controller with DC output of 500 volts, 30 amps.

ii) trigger network design using 74 series TTL logic circuits

iii) pulse driver network for thyristor triggering

iv) current sensing and limiting network for automatic starting

v) magnetic pulse tachogenerator for speed monitoring and feed back control

vi) feed back circuit design for 0.5% speed control accuracy

vii) special control circuits for regenerative breaking and reversing

viii) regulated power supplies

ix) separate DC power supply for field

x) HRC fuse protection link for thyristor and motor

xi) meters for speed and torque monitoring,

xii) three phase mains contactor design for motor protection.

The DC motor controller is reversible in its applications for motors upto 10 HP. The pulse tacho-generator and the feed back control technique greatly improve the accuracy of operation to 0.5% against the load variation and power supply fluctuations. The compensation circuit limits the speed over-shoot to 30%. Continuous maximum torque can be obtained upto the lower speed limit. Regenerative breaking facility has been incorporated for instant stop of the motor. Armature reversing is possible. Motor starting is automatic by current sensing and feed back. Modular design concepts have been used for ease in manufacture, maintenance and operation.

A number of prototype controllers of the following specifications have been fabricated at the laboratory and are in use.

Power Supply

400V 3-phase 50Hz 01KW

Built in DC Power

+ 12V, 500 MA 0.2% regulation
+ 12V, 2 Amp 0.1% regulation
+ 12V, 500 MA 0.1% regulation
+ 5V, 1 Amp 0.1% regulation
+500V, rectifier supply for the field

Dual Thyristor|Bridge

12 Thyristors to supply 500V, 30 Amp DC on either direction

Speed senser

Magnetic pulse tachogenerator to sense speeds upto 5000 rpm

Current senser

AC current transformer and instrumentation for currents upto 30 Amps.

The major materials and components required are thyristors, integrated circuits, transistors, diodes and rectifiers, transformers and inductors, resistors, moving coil meter, heat sinks, band switches, toggle switch etc., electrolytic, tantalum, cer-ceramic and other capacitors. Thyristors and some of the ICs will have to be imported.

10 MHz Oscilloscope, microvoltmeter, frequency counters, volt meters and general workshop machinery are the main items of equipment required.

The capital investment for a unit having a capacity to manufacture 30 units per year is estimated at Rs 0.2 million, excluding land and buildings. An existing manufacturer of similar items can take up its production without much additional investment. The unit can employ about eight persons. The process has not been licensed so far.

## Reconditioning/Fabrication of Cathode Ray Tubes/TV Picture Tubes

Cathode ray tubes are vital parts of cathode ray oscilloscopes, radar display system, TV receivers etc. They are used for displaying signal wave forms in almost all electronic applications.

With the opening of more TV stations all over the country the number of TV sets operating in the country is fast increasing. Accordingly the requirement of TV tubes would also considerably increase in the next few years. Further, the average life of TV picture tube is about 3000 hours. After this, the tube requires reconditioning. The common faults, which occur in a used TV tube are poor vacuum, burnt out heater, low cathode emission and bad screen. The cost of reconditioning will be considerably less than the cost of a TV tube.

The process involves various operations on the glass shell to serve as screen, fabrication and mounting of the electron gun and mounting it on the stem. Preparation of the glass shell involves the chemical cleaning of the glass bulb, phosphor deposition, lacquering and dagging, aluminizing and baking. The fabrication of the electron gun involves cleaning of the gun parts, assembly of the electron gun and mounting of the gun on the stem. The electron gun is then sealed to the glass bulb. Further work for fabrication of tube involves evacuation, baking, getter, flashing, sparking, ageing and testing of the complete tube.

The National Physical Laboratory, Council of Scientific & Industrial Research, New Delhi-110 022 has successfully fabricated and batch produced cathode ray tubes type 5 UP having the following characteristics.

Accelerating voltage : 1500 V
Higher frequency limit: 5 MHz
Screen size : 5" round

The laboratory has also fabricated and reconditioned TV picture tubes of various sizes on a batch scale.

Some of the main items of materials and components needed are glass bulbs, glass stems, phosphors, stainless steel sheet and rod for guns, ceramic rods, cathodes and heaters, ring getters, chemicals etc. Out of these glass bulbs, glass stems, cathodes, and heaters and ring getters have to be imported.

Some of the main facilities and items of equipment required are tilt tables, CR tube bulbs and TV tube bulbs, dagging machine, gun assembly tables, ultrasonic cleaner, induction furnaces, vacuum pumps with vacuum gauges, baking ovens, glass working lathes, power supply for activation, test console for CR & TV tubes etc., ionisation gauge heads and power supply equipment may have to be imported if not available indigenously. Chemical cleaning laboratory, clean room for phosphor deposition and clean room for assembly will have to be provided.

The total capital investment for fabrication/reconditioning of TV picture tubes varies with thecapacity of the plant. For plant having a capacity to recondition 10,000 & 1,000 tubes per annum, the capital investment is estimated at ₨ 1.0 million and 0.15 million respectively.

Man power required for a plant producing 1,0000 and 1000 TV picture tubes per annum is estimated at 40 and 5 respectively. The process has been licensed to three parties. Two of them have started reconditioning of the picture tubes.

## MINERAL BASED INDUSTRIES

### Door and Window Frames from Magnesium Oxychloride Cement and Saw Dust

Magnesium oxychloride cement has found application in the manufacture of flooring tiles, flooring compositions, woodwool building boards and other precast products. A process for use of magnesium oxychloride cement in making door and window frames has been developed at the Central Building Research Institute, Roorkee.

These frames possess adequate strength, good durability, screw holding property, machinability and paint holding property. The frames can be easily cast and erected at site.

Magnesium oxide and dolomite powder are mixed with saw dust. Magnesium chloride solution is added to this mixture and poured into the moulds with reinforcement in position. Thorough compaction is achieved, preferably by using a plate vibrator, and the surface smoothened by trowel. Care is taken that the corners and edges are properly filled. All the vertical and horizontal members must be cast separatly. Demoulding of the frames is done after a lapse of suitable time from casting; the members are assembled after they are air cured.

A few frames have been made and tested at the laboratory.

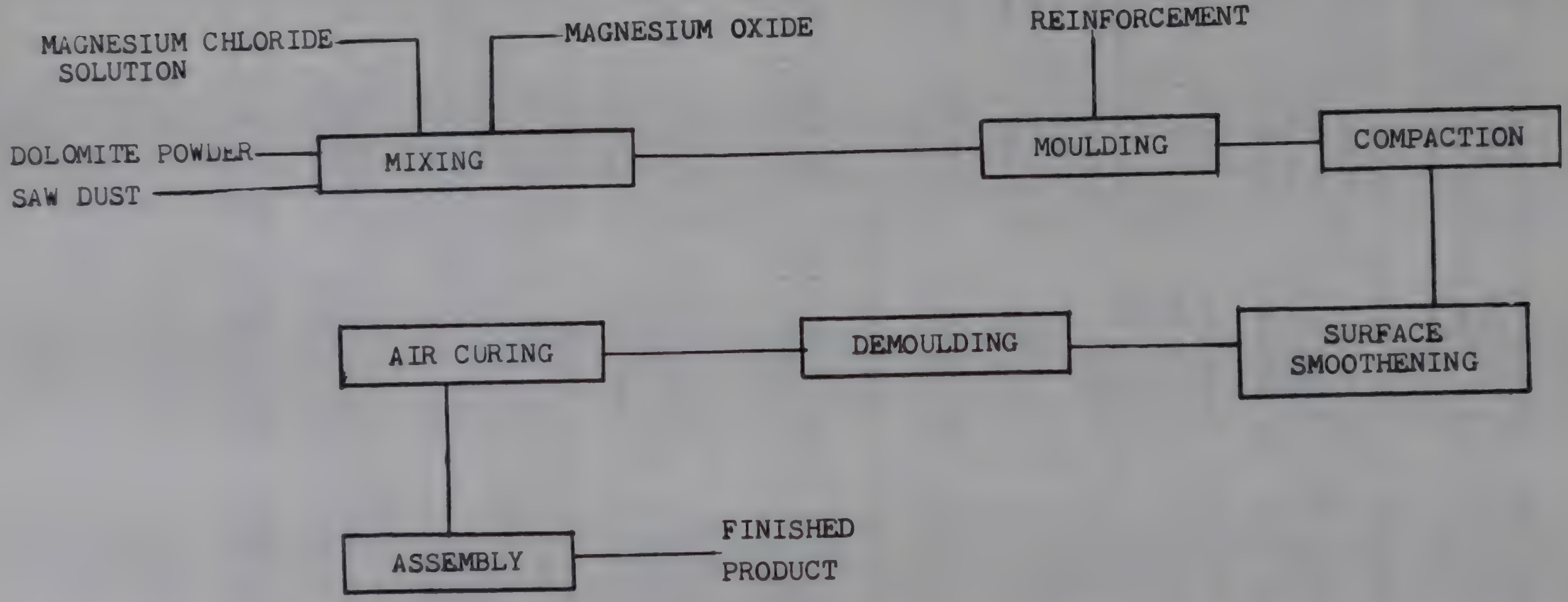
The main raw materials required are magnesium oxide powder, magnesium chloride, marble or dolomite powder, saw dust. All these are available indigenously. The major items of equipment required are surface vibrator, mould sets, concrete mixer, weighing machine, sieving mesh. All these are available indigeneously.

It is estimated that a plant having a capacity to produce 50 frames per day (one shift basis) would need an investment ₨ 0.25 million, excluding land and building. The plant has a potential to provide employment for about 10 persons. The process has been licensed to 6 parties, one of which is in production.

### FLYASH SAND LIME BRICKS

Sand lime bricks are generally manufactured by curing a pressure moulded mixture of sand/siliceous material, lime and water under saturated steam or steam at atmospheric pressure. This is also known as autoclaving or hydrothermal treatment. Experiments carried out at Central Building Research Institute have shown that flyash obtained from thermal power stations using pulverised coal can be substituted in part for sand in making flyash-sand-lime bricks.

## BLOCK FLOW DIAGRAM FOR DOOR & WINDOW FRAMES


MAGNESIUM CHLORIDE SOLUTION
MAGNESIUM OXIDE
DOLOMITE POWDER
SAW DUST
MIXING
REINFORCEMENT
MOULDING
COMPACTION
SURFACE SMOOTHENING
DEMOULDING
AIR CURING
ASSEMBLY
FINISHED PRODUCT

It is estimated that about 8 million tonnes of flyash would be available in our country by 1981, the disposal of which is considered a big problem. The process of making flyash sand lime bricks is one of the solutions for utilization of flyash.

The bricks produced by this process are of light grey colour and uniform in shape and size. They have high strength, low water absorpton, and low coefficient of variation, which enables the design of the brick work with a low safety factor resulting in a saving of about 30 per cent in the use of mortar and plaster.

The process of making flyash-sand lime bricks is quite simple. Broadly three operations are involved i.e. (i) Mixing, (ii) Pressing and (iii) Steam curing. Sand, flyash and lime and thoroughly mixed in semi-dry condition and pressed in a suitable press at the optimum pressure. The pressed bricks are loaded on to small hand driven trolleys and taken into a steam curing chamber/reservior. After steam curing, the bricks are dried in the sun for a day before they are ready for use.

The work has been carried out on a laboratory scale and the bricks made have been tested and found satisfactory.

The major raw materials required are:

Flyash: Generally flyash with about 60% $SiO_2$ would be suitable. $Al_2O_3$ and $Fe_2O_3$ contents together may be about 30-35%. High $CO_2$ content would be useful.

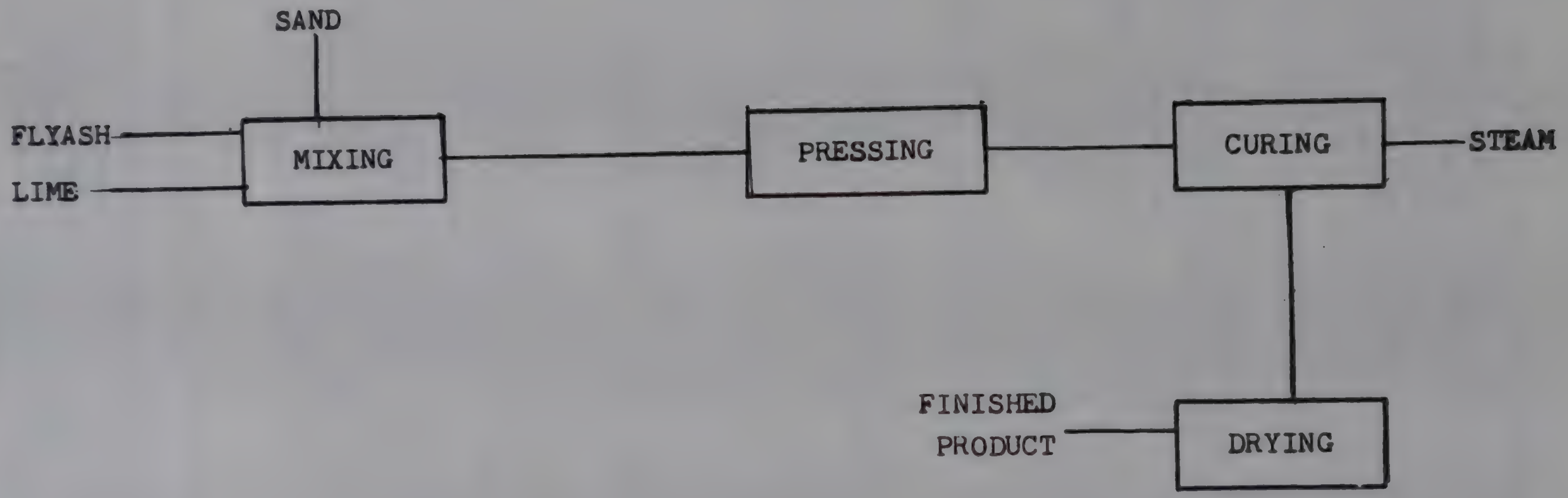
Sand: Any clean river or sea sand with about 70 per cent $SiO_2$ content can be used. The sand should not contain excess clay. Higher percentage of inert materials such as calcium carbonate (calcite) in calcareous sands may be tolerated.

Lime: Dry hydrated lime either of high calcium type (Type-C; IS: 712-1964) or hydraulic type (Type-A&B;IS: 712-1964) may be used. Highly dolomitic or magnesium lime is not desirable. All the raw materials are indigenously available. The major items of equipment required are press, boiler, steam chambers and mixer. These are available indigenously.

It is estimated that a plant having a capacity to manufacture 3000 bricks per hour, working in three shifts a day for 300 working days a year would cost ₨ 0.4 million.

This plant can employ about 10 persons. The process has been licensed to one party and is in the stage of implementation.

## BLOCK FLOW DIAGRAM FOR FLYASH SAND LIME BRICKS


SAND
FLYASH
LIME
MIXING
PRESSING
CURING
STEAM
DRYING
FINISHED PRODUCT

## Precast Ferro-Cement Bins

The farmers store food grains in small quantities in traditional and unscientific storage structures resulting in (a) huge loss of food grains due to infestation and rodents and (b) reduction in the nutritional content of grain, It is estimated that there is an annual loss of about 10% in the total grain produced in the country. With about 110 million tonnes of food grains being produced annually, the loss works out to about 11 tonnes.

Ferro-cement is lighter and consumes less steel and cement as compared to conventional reinforced concrete and costwise it is likely to prove competitive. Ferro-cement water tanks for small capacities will definitely be economical and require almost no maintenance when compared to the steel overhead tanks currently in use for domestic and general purposes. With various advantages and diverse applications ferro-cement has a good potential for use in the rural areas. Application of ferro-cement for small capacity grain storage bins and gas holder units for gobar gas plants holds good promise in rural development.

The Structural Engineering Research Centre, Roorkee has developed a simple semi-mechanised process for casting thin ferro-cement cylindrical units. This process requires neither sophisticated equipment nor power. The process consists of an inner mould for the cylindrical unit. The wire mesh is rolled over the mould and mortar is applied by hand pressure and rubbed on the wire mesh, layer by layer, in a continuous process till the required number of layers are plastered. The number of layers of wire mesh and the thickness of the unit depend upon the loading on the structure. Using this simple process, units with a minimum thickness of 1 cm can be cast.

The ferro-cement bins developed are cylindrical in shape and are assembled out of prefabricated units. Depending on the individual consumer's requirement, 1-Tonne, 2-Tonnes or 3-Tonnes units may be assembled by erecting one, two or three wall units respectively and filling up the joints by cement mortar. A reinforced concrete base slab and ferro-cement dome shaped roof are provided to make theunit complete. A manhole is provided in the roof for loading and unloading the grain. Rubber gaskets are provided for inlet and outlet. The bins are painted with bitumen aluminium paint to make them damp proof.

The research centre has successfully made a few bins

The major raw materials needed are woven wiremesh, welded wire mesh, or chicken mesh, portland cement, water proofing chemicals of approved grade, coarse sands, crushed or river gravel aggregated, mild steel bars, coal tar emulsions, bitumen aluminium paint and rubber gaskets for outlet and inlet. All these are available indigenously.

Moulds made of masonry or wood, base unit frame moulds made of M.S. flats and hand tools for mason, are the items of equipment required, which are available indigenously.

The capital investment for a unit having a capacity of 15 bins per day (one shift) or 4500 bins per annum is approximately Rs 0.5 million, excluding land and buildings.

The unit has a potential to employ about 10 persons. The technique of casting of ferro-cement units can be easily acquired by local labour. The process has been licensed to two parties, and one of them is in production.

# New Machinery and Equipment

## ELECTRONICS & ELECTRICAL EQUIPMENT

### Automatic Test Rig

The Regional Testing Centre, Government of India, Bombay has designed and developed an automatic test rig for conducting life test on various types of switches used in flashlights. It is claimed to be the first of its kind in the country. The flashlight switches are to be tested for 25,000 cycles of operation under actual load conditions according to Indian Standards Specification IS: 2083: 1978. The switch has to be operated at a rate of about 30 cycles per minute. The automatic test rig performs this duty automatically without requiring any personal attendance or supervision.

It has got two units: (i) control console (ii) switch actuating mechanism. The test rig works on single phase A.C. supply and consumes only 35 watts (iii) control console has all the adjustments and monitoring systems, such as load current and voltage indicator and controls, recording and display of the number of operations of the switch at any instant. Visual indicators for monitoring switch operation and the fault indication when the switch fails (iv) The actuating mechanism consists of motorised actuator for particular type of switch to operate it at rated cycles whose working is controlled by the control unit (v) The counter stops within 1 cycle in the event of any of the following types of failures of the switch - (a) fails to open (b) fails to close (c) fails to hold the contact i.e., becomes momentary contact type. Also a visual indicator of fault appears on the panel. At the same time switch actuating mechanism and power to other circuits is cut off.

### Facsimile Transceiver

Electronics Corporation of India Ltd., has developed an indigenous facsimile transceiver for the first time in the country which can transmit information quickly.

The transceiver has a wide range of applications. It can transmit news in any language besides transmitting photos.

Commercial organisations could transmit data sheets, charts and engineering drawings between their offices located at any distances. The transceiver functions on telephone lines and transmits the message in a few minutes. The cost of one set, one receiver and one transmitter will be around ₨ 20,000 when it reaches the market by March, 1982.

Facsimile transceiver, when used as transmitter, scans the original documents, which rolled on its drums, converts the light and dark areas into electronic signals and transmits them over regular telephone lines. At the other end, the transceiver, in receive mode, receives these signals, converts them and records it on an electrosensitive paper. The result is an exact replica of the original. The time of transmission can be varied on the type of document to be transmitted.

The maximum size of the original that can be transmitted through facsimile transceiver is 210 x 297 mm.

The reproduction obtained is in black and white with proper gray scales on an electrosensitive paper and requires neither special storage nor spray fixer or any other special handling.

The reproduction is light-proof, smudge-proof and never fades. It can be handled easily and one can transmit the message with some knowledge of transmission.

## Flow Meter

Select oscillating piston meters with glandless transmission and magnetic coupling from piston to dial are suitable for measurement of corrosive and non-corrosive fluids. The meters are hermetically sealed in the centre and no liquid comes in contact with the gear train. It has an easy-to-read indicating and resetting dial with metric calibration and a 6-inch horizontal or vertical dial with central reset pointer and 5-digit non-reset totaliser.

Unlike propeller-type meters, select piston meter positively measures actual volume of the liquid, thereby improving accuracy of measurement, which is independent of turbulence and viscosity.

All parts in contact with liquid are manufactured using chemical resistant materials, and therefore, meters for chemical services are suitablefor use in plants manufacturing alkalies, solvents, acids and petrochemicals, etc. Sizes range from 3 to 300 mm and capacities from 4 to 1,600 LPM depending upon the nature of the flowing fluid.

Further, the select range of electronic flow meters are also introduced for precision measuring of flow of chemicals and alkalies, acids and petrochemicals, Remote electronic display is also incorporated.

For further information write to Scientific Equipment Sales Private Limited, Shahali Banda, Hyderabad-500265.

## Humidity Kit

The humicap is a capacitive thin-film humidity sensor, a unique Finnish invention. Since its coming to the market in 1973, thousands of humicaps have formed the basis of hygrometer control systems and humidity measurement in radiosondes all over the world.

The success of humicap is based on the following characteristics Humicaps cover the measurement range of 10 to 100 per cent RH. They operate in extremes of temperature from minus 40 degrees to 115 degrees C. They have a very fast response; they are very small and their thermal mass is negligible. They measure even in extremely limited spaces, remain stable over long periods and operate from vacuum to 20 bars.

The word humicap has come to mean not only a sensor but also any humidity probe or system featuring the humicap sensors.

The humidity instrument range covers hand-held probes for spot checks and instruments for fixed installation in continuous measurements. Pressure-proof flange mounted industrial probes can be fitted directly into the process line. Probes can be remotely installed from the indicator. Temperature measurement is generally included.

## Megger Digital Earth Tester

Megger Instruments Division of Evershed & Vignoles Ltd., at Dover and represented in India by Josts Engg. Co., 60 Sir P.M Road, Bombay 400 001 have introduced a new model DET2 Megger earth tester claimed to be an advanced and highly sensitive instrument developed to be particularly suitable for use to the electricity contractors working on large scale projects.

The DET2 extends the ET series of Megger earth tester and has four applications: (1) testing of earth electrodes particularly on extensive earthing systems covering a physically large area (2) measurement of soil resistivity to enable optimum siting of earth electrode systems prior to building construction (3) surveying of geophysical characteristics, such as water tables, with particular applications for geological prospecting and cathodic protection (4) testing of earth bonding in electrical installations and direct resistance measurements down to 1 milliohm.

Reading can be taken from 1 milliohm to 2000 ohms in ranges. This provides the discrimination demanded when testing the low resistances associated with very large earthing systems. The accuracy is 2 per cent of reading ± 2 digits.

A particular safety feature is the limiting of the test voltage of 50V maximum. In its measuring mode, the DET2 falls within IEC Safety Class III.

## ENGINEERING EQUIPMENT

### Drum Lifter

Bahubali drum lifter is an indigenously developed device for handling standard 205 litres drums/barrels weighing upto 300 kgs. This is specially designed to suit Indian conditions. Drum Lifter is mainly used for lifting, shifting, tilting and emptying of standard drums. This can also be used for mixing operations. The uniqueness of the above equipment lies in the fact that all above functions can be done by only one person.

The drum lifter is fabricated with a robust steel structure. The frame is mounted on solid rubber wheels with bearings ensuring smooth and easy movements on all types of surfaces. It is a quick andeasily operable drum handling equipment and has a long service life. It ensures absolute safety against personnel and hazardous accidents. It is specially recommended for safe handling of barrels containing hot, toxic, corrosive and poisonous hazardous materials.

Bahubali drum lifter has exclusive advantages of transporting hot and cold materials in open barrels with full load. It can empty the barrel without any wastage of costly chemicals, oils, lubricants, etc., and is ideal for easy, efficient and smooth handling of barrels, saving substantial amount of labour cost. Bahubali's design feature incorporates economical and aesthetical aspects for simple design to solve industrial handling of drums and barrels quite easily.

The drum lifter is ideally designed for use in chemical, pharmaceutical, food, fertilizer, engineering, oil, paint, petrochemical, textile and other allied industries.

For further particulars of Bahubali drum lifter and on drum handling, please contact: Fibro Industrial Trading Company, Kurla Andheri Road, Sakinaka, Bombay-400072.

### Planing Machine

M/s. Utkur Engineering Works (1325/37 'A' Ward, Shivaji Udayama Nagar, Kolhapur-416001) have manufactured an all-geared heavy duty planing machine which claims to be of double housing type with electromagnetic drive control and pneumatic tool lifting arrangement, with mechanite castings and helical gears.

The UE-3000 model has a maximum stroke of 3000 mm. Maximum height and length is 1000 mm. Length of bed is 4800 mm. and main motor is of 940 rpm 7.5 KW (10 H.P). Three cutting speeds are available ranging from 11,16 and 22 mtr. per minute. Return speed is 28 mtr. per minute.

## Ploughshear Mixer

Pabdecon Engineers (1/18 Kailas, Sainath Nagar, Ghatkopar, Bombay-400 086) has introduced a high speed ploughshear mixer which consists of a stationary horizontal cylinder enclosing specially designed plough shaped mixing impellers mounted on heavy duty shaft rotating at high speed. The ploughs impart intense but gentle three-dimensional motion to the particles inside the cylinder, causing a continuous hurling and whirling action and thus achieving a homogenous mixture of the product. Dead zones are completely eliminated and so also the squashing of product particles; as a result, fragile and heat sensitive material can easily be handled.

The Ploughear mixers can be supplied for batch or continuous operation. Batch volumes can range from 25 to 4000 litres.

## Thread Rolling Machine

Ingramatic of Italy are reputed manufacturers of automatic-flat-die thread rolling machine for economical production of screws and bolts. The machines are suitable for both small-scale and mass production of all types of screws and bolts.

The machines are of a rigid construction, and permit easy tolling changeover and adjustments. The blanks are fed with correct orientation through a rotating drum-type feeder. The speed can be changed even while the machine is running on load. The feeding of blanks is positive and is constant in number once the machine has been pre-set.

The machine has automatic centralised oil-lubrication system for all wearing parts and it stops on failure of lubrication due to fall in oil pressure or oil-lever. A standard feature is the automatic chip-separator. The machine is designed to accommodate tools of different types or even those made for other types of machines.

There are different models for a production rate of up to 600 pieces/minute, thread diameters up to 12 mm and thread lengths up to 75 mm. The machines can be imported by actual users under OGL.

For further information, please write to: Precision International, P.O. Box 3041, New Delhi-110003.

## Welding Unit

Indian Oxygen Limited (IOL) has developed a semi-automatic welding equipment - the Indarc KIG 130 - specially designed for the welding of thin mild steel sheets including applications in automative industries. Very simple to operate, it welds with the precision and versatility of a sophisticated equipment. At the same time, it brings the user the cost saving efficiency of MIG welding without the complexity of conventional multiple units.

MIG 130 is a composite unit, with built-in power source, wire feeder and gas cylinder carrier. It only needs a 230 volts amps, AC domestic power supply. The welder has only to plug in, switch on, dial the required metal thickness and weld. No separate setting of welding conditions is necessary. The machine can weld anything from 0.55 mm to 3.2 mms panels. It has provision for spot welding and stitch welding and can also weld thin sheets to thick plates and is excellent for bridging gaps.

For further information: Please contact: Marketing Manager AWE, Indian Oxygen Limited, Oxygen House, P-34, Taratala Road, Calcutta-700088.

# Industry Roundup

This section highlights policies and procedures, guidelines, the present status and future prospects in certain industries as well as the latest available data in respect of such industries.

## PESTICIDES INDUSTRY

### 0. Introduction

Pesticides are a group of chlorine agents used in plant protection, public health purposes, household sprays and in-fumigation for the protection of agricultural products in storage. The general term pesticides includes, insecticides, fungicides, rodenticides, molluscicides, nematocides and weedicides. The manufacture of pesticides commenced in India in 1952 with the setting up of a plant for the manufacture of Benzene hexachloride (BHC), which was followed by D.D.T. The great impetus towards the wide application of pesticides occured during the Third Five Year Plan when agricultural development revived priority within the frame work of India's planning for development. There was infact a drastic change in 1966 with the introduction of 'comprehensive area development strategy'. This resulted demand for larger quantum of pesticides.

### 1. Policy

For the purpose of import of raw materials, this industry is accorded priority. Import of pesticides which are not manufactured in India in commercial form is allowed freely. Import of pesticides which are manufactured in the country is banned and restrictions are imposed on the import of such items which compete with local products. The creation of new formulation capacity is not being encouraged unless it is linked with a definite and time bound programme for the manufacture of basic pesticides. However, as per the recent decision, substitution is permitted with other pesticides in place of those which have been banned for use.

## 2. Present Status

There are about 111 types of pesticides in use out of which 45 are manufactured in India with production level of 50000 tonnes valued at ₨ 60 crores. The manufacturers, include, medium and small industrial undertakings. There are about 21 units manufacturing technical grade material and 41 units manufacturing formulations. In addition, there are, over 350 small scale units engaged in the manufacture of conventional formulations. The total licensed capacity of pesticides is 92088.8 tonnes. Installed Capacity is 73,750.8 tonnes.

Total annual consumption of pesticides is as follows:

| Year | Quantity |
|---|---|
| 1973-74 | 50,432 tonnes |
| 1975-76 | 57,153 tonnes |
| 1977-78 | 58,980 tonnes |

Keeping in view, the gestation period, around three years for the established pesticides with proven technology and five years for new products, the capacity expected to materialise during three years, production, capacity utilisation and foreign exchange requirements for importing basic chemicals are given as under.

| Year | Capacity expected to be installed (tonnes) | Estimated production (tonnes) | % Utilisation | Foreign exchange requirements ₨ Million |
|---|---|---|---|---|
| 1980-81 | 68,000 | 54,000 | 79 | 60.5 |
| 1981-82 | 73,000 | 59,000 | 80 | 73 |
| 1982-83 | 80,000 | 65,000 | 81 | 84.5 |

Production trends of technical grade pesticides in India during the period from 1967 to 1977 are indicated as below:

| Year | Output '000 tonnes |
|---|---|
| 1967 | 15.4 |
| 1968 | 15.8 |
| 1969 | 18.6 |
| 1970 | 24.1 |
| 1971 | 23.1 |
| 1972 | 26.7 |
| 1973 | 31.6 |
| 1974 | 32.7 |
| 1975 | 35.2 |
| 1976 | 34.6 |
| 1977 | 40.6 |

Selected varieties of pesticides are still being imported into India. Imports during 1978-79 were 11,000 tonnes.

India's export of pesticides during the period 1974-75 to 1977-78 is as follows:

| Year | Value in lakhs |
|---|---|
| 1974-75 | 121 |
| 1976-77 | 212 |
| 1977-78 | 16 |

At present no reliable data are available about the existing formulation capacity in the small scale sector in the country. According to the information furnished by the Pesticides Formulations Association of India there are about 350 working units making formulations in the small scale sector. The installed capacity is as under.

| | | |
|---|---|---|
| 1. | Dusting powders | 36000 TPA |
| 2. | Wettable powders | 90000 TPA |
| 3. | Emulsifiable concentrates | 45000 K.L |
| 4. | Granules | 3750 TPA |

The main concentration of these units is in the states of Andhra Pradesh, Gujarat, Tamilnadu and Maharashtra. The small sector suffers from two major handicaps in this field viz. quality control and marketing network.

## 3. Demand

Estimated requirement of pesticides is as below:

(Tonnes)

| S.No. | Name of the item | 1981-82 | 1982-83 | 1983-84 |
|---|---|---|---|---|
| 1. | Insecticides | 40965 | 43320 | 46515 |
| 2. | Acaricides | 200 | 210 | 220 |
| 3. | Fungicides | 11568 | 12013 | 12508 |
| 4. | Rodenticides | 650 | 750 | 850 |
| 5. | Weedicides | 2320 | 2545 | 2770 |
| 6. | Nematocides | 45 | 50 | 55 |
| 7. | Plant growth regulator | 45 | 50 | 55 |
| 8. | Fumigants | 1175 | 1250 | 1325 |

The quantities consumed for public health are not included in the above figures. The estimated demand of pesticides by 1984-85 is of the order of 115,5000 tonnes.

## 4. Process

For some particular pesticidal formulations, a certain amount of sophistication is required in the process of manufacture and after sales service is also equally important and in such cases it may not be possible for the small scale sector to play the required role. Keeping this, in view, it is proposed that the public sector/joint sector should have higher participation in such activities. For certain formulations the process is easy so that the small units can manufacture.

## 5. Research & Development

With regard to the indigenous technical know-how, the contributions made by the national laboratories are laudable. Research will have to play a very important role in the growth of pesticides manufacture and usage in India. The basic manufacture of as many pesticides as possible must be taken up. Fundamental synthesis and screening of new compounds for pesticidal activity is most essential. Pest problem not yet adequately controlled by current pesticides also need to be looked into. There also exists a great scope of developing suitable OP compound which can show both the insecticidal and systematic fungicidal activity.

## 6. Future Scope

There is vast scope for establishing new units. Wherever needed the government is prepared to consider on merit, proposals for foreign collaboration for the manufacture of basic technical material. Besides, the need for the application of pesticides for crop protection in the future, cannot be overemphasised in view of extended public health programmes. High priority is being assigned to agrarian development with emphasis on the application of fertilizers and high yield variety seeds. The success will not be complete unless adequate crop protection measures are implemented by the use of pesticides.

## 7. Conclusion

The success of the industry depends upon the usage of the products. Hence the training of user (farmer) in using the pesticides is essential which can be undertaken by the industry and government through their agencies. The problems of quality control and marketing of the product should be overcome by careful planning. Once these problems are solved the industry can play a vital role in boosting the agricultural production. (MSR)

*Section IV*

# Current Technical Literature

Copies of articles/documents listed in this section are available on payment of ₨ 5/- for the first 5 pages or part thereof and Re 1/- for every subsequent page of the photocopy or xerox copy of the article/document. While placing the order please mention the CTL number of the SENDOC Bulletin.

| Subject Index | CTL Nos. |
|---|---|
| Agro Industries | 585-590 |
| Chemical Industries | 593-598 |
| Dyes | 599-600 |
| Electrical Industries | 614-617 |
| Electronics Industries | 618-624 |
| Energy Sources | 579-584 |
| Food and Allied Industries | 591-592 |
| Mechanical Engineering | 601-607 |
| Mineral-Based Industries | 608-613 |

## ENERGY SOURCES

579. -----: Gobar gas to the fore. Chemical Weekly, 1981, 26(27), 104.

A brief review of the gobar gas plants is given. (MSR)

580. -----: Solar dryers enhance quality of dried fruits and vegetables. Invention Intelligence, 1980, 15(7), 277-279.

Describes construction details of solar dryers designed by Regional Research Laboratory, Jammu, for speedy and hygienic dehydration of fruits, chillies and agricultural produce, in rural areas, along with a sulphuring chamber. (JBS)

581. GARG, H.P. & RANI, U.: Flat-plate collectors - for domestic applications. Invention Intelligence, 1981, 16(3), 131-133.

The basic requirements for a solar collector system are low thermal resistance, good mechanical strength, high resistance to corrosion, low cost and low thermal capacity. The types of collectors, their advantages and disadvantages and those which are mainly used for heating water for domestic use are discussed. (JBS)

582. JAIN, B.C.: Developments in the area of non-conventional sources of energy-at Jyoti Ltd. Research and Industry, 1981, 26(2), 82-86.

R&D efforts made by the Energy Division of Jyoti Ltd., Baroda, in the areas of direct solar thermal systems, solar energy-based cooling systems, wind energy conversion systems and bio-conversion systems, and the appliances and equipment developed and marketed by the Company are described. (AA)

583. KALRA, S.K. & BHARDWAJ, K.C.: Use of simple solar dehydrator for drying fruit and vegetable products. Journal of Food Science and Technology, 1981, 18(1) 23-26.

Two models of solar dehydrators were constructed with mixed functions of direct and indirect dryers. In model I, the trays were placed in a separate chamber and in model II, the trays were adjusted inside the collector. The model I and model II attained 10-20°C, 20-25°C respectively higher temperature than the open atmosphere. Sample of mango slices, mango leather, green peas, okra and three potato products were satisfactorily dehydrated. On an average, model II reduced the moisture to 6 per cent in 7 hr and model I to 7 per cent in over 8 hr compared to about 9 hr 2870 needed in open atmosphere for getting 8 per cent moisture. The products were considered qualitatively superior to the open sun-dried products. The solar dehydrators are simple to fabricate and are well suited to rural conditions and small scale food processing industries. (AA)

MANJUNATHA UDUPA, K.: Simple solar energy collector for rural use. Invention Intelligence, 1981, 16(5), 230-233.

Proposing a simple and economical design of solar collector which can be fabricated with skills and equipment available in rural India.

## INDUSTRIES

-----: An analysis of availability and uses of molasses in India. Industrial Researcher, 1980, 7(1), 53-57.

The production of molasses has increased 20-fold between 1932-33 and 1978-79. The state-wise production of molasses, exports, consumption of molasses by alcohol industry, end use pattern of alcohol, availability andfuture demand for molasses for manufacturing alcohol are discussed. (JBS)

-----: Availability of molasses: A review. The Chemical Times, 1981, 8(6), 8,12.

Reviews the availability of molasses in various states and suggests for the modernisation of distillery industry. (MSR)

KHARBANDA, O.P.: Molasses - The precious feedstock and citric acid. Colour and Chemical Weekly, 1980, 6(35), 47-48.

Outlines the various potential uses of molasses as raw material with special reference to the manufacture of industrial alcohol and citric acid. Provides also a table showing the relative work of products from molasses. (CV)

VENKATESWARAN, S.L.: Chemicals from sugarcane bagasse: Potentialities. The Chemical Times, 1981, 8(10), 8,10.

Reviews the availability of bagasse from sugar industry and its storage problems. Examines the potentiality of bagasse for pulp and chemicals. (MSR)

589. VENKATESWARAN, S.L.: Conversion of bagasse into chemicals: Process. The Chemical Times, 1981, 8(11), 8,10.

Examines the possibilities of pulping bagasse on the lines of wood pulping and probes into the use of bagasse to get chemicals. (MSR)

590. VENKATESWARAN, S.L.: Conversion of bagasse into chemicals: Processes. The Chemical Times, 1981, 8(12), 8,11,12.

Examines various processes to get methanol, ethanol etc., from bagasse. (MSR)

## FOOD AND ALLIED INDUSTRIES

591. LEWIS, Y.S. et al: Processing and Utilization of Plantation products of India. Journal of Food Science and Technology, 1980, 17(1&2), 38-42.

Deals with technological and analytical studies on coffee, tea, cocoa, arecanut and spices.

592. SUBRAMANIAN, N.: Technology of Vegetable Protein Foods. Journal of Food Science and Technology, 1980, 17(1&2), 71-77.

Deals with the progress of work on the technology of vegetable protein foods in India with special reference to the processing and utilization of oilseeds.

## CHEMICAL INDUSTRIES

593. -----: Ammonium persulphate. Chemical Engineering World, 1981, 16(4), 101.

Discusses the details of process, raw materials, equipment and economics for production of ammonium persulphate.

594. -----: Diazepan. Chemical Engineering World, 1981, 16(3), 105.

Gives the industry profile discussing NCL process, market potential, prices, equipment and terms of release by NRDC. (BS)

595. -----: Soda ash - A market study. Industrial Researcher, 1980, 7(1), 59-63.

Reviews the status of soda ash industry in India giving details of installed capacity, production, capacity utilisation, imports and exports, end-use pattern, consumption and demand supply gap. Briefly tabulates production of soda ash in some important countries and discusses the manufacturing process and properties. (JBS)

596. -----: Sodium chloride A.R & I.P. from marine salt. NRDC Process No. 892.11.80. Chemical Industry News, 1981, 25(10), 796-797.

Gives the process details, raw materials, equipment and economics for the manufacture of sodium chloride AR & IP.

597. -----: Sodium silicate from rice husk ash. Colour and Chemicals Weekly, 1981, 7(8), 43.

Gives a brief profile on sodium silicate from rice husk ash for a plant capacity of 300 tonnes per year at an investment of ₨ 50 lakhs, highlighting the major advantages and indicating block flow diagram.

598. RAJGOPAL, S.: Prospects for industrial growth in Maharashtra in the 80's - in the oil, gas, chemical and process engineering industries. Chemical Engineering World, 1981, 16(3), 53-59.

Reviews the status of the chemical industry in India in terms of no. of factories, investment, employment, input, output, etc. Enumerates the development of Bombay High and industries based thereon. (BS)

## DYES

599. -----: Extracts from the report of the committee to review the policy on the role of small scale vis-a-vis the organised sector for the manufacture of dye-stuffs. Chemical Weekly, 1981, 26(23), 69-76.

Gives the view of the committee on the manufacture of different dyestuffs by the small scale sector and the organised, medium and large scale sector. Presents the statistics on production of dye stuffs in both se sectors, capacity utilization and demand by 1983-84.(MSR)

600. -----: Growth potentiality for Exports of Indian dyestuff. Industrial Researcher, 1980, 7(1), 10-12.

Examines the venues of the dyestuff market in the South East Asian countries, particularly in Malaysia, Singapore and Indonesia and these countries will remain good export market for Indian dyestuff in the near future. (JBS)

## MECHANICAL ENGINEERING

601. -----: Belt grinding. Engineering Materials and Design, 1980, 24(4), 33-34.

Discusses the essential characteristics of a new range of machines being developed for belt grinding which is ten times faster in metal removal rates than other stock removal methods. (SS)

602. ARAVINDAN, P.: Fixture for milling globoidal indexing cams. Invention Intelligence, 1980, 15(10-12), 458-461.

Globoidal indexing cams are widely employed in commonly used indexing systems, like automatic machines, notching presses, transfer machines, envelop folding machines, cap assembly machines and multicolour printing machines. The fixture was designed by simulating the motions involved in the operation of globoidal indexing cams. It has been successfully used to machine a number of such cams, whose service has been found to be satisfactory.

603. BASU, S.K.: Technological development in the Indian machine tools industry. Invention Intelligence, 1980, 15(4), 148-154.

Reviews the present status of the Indian machine tools industry and identifies the technological gaps vis-a-vis the acquisition and assimilation of new technology aimed at building up economic self-reliance.

604. BATCHELOR, J.: Permanent magnets (Technical file No. 83), Engineering, 1980, 220(11), I-IV.

Attempts to expand the understanding of the effect as well as reintroducing the physics of magnetism with special emphasis on permanent magnetism and magnetic materials. Includes a note on magnetic measurements. (MVS)

605. CHADHA, B.R.: Anti-seizure for diesel engines. Invention Intelligence, 1980, 15(4), 159.

The mechanical device called anti-seizure prevents engine seizure when the pressure of the lubricating oil drops below the permitted limit or when its flow stops altogether.

606. DATTA, P.K.: Vertical milling attachment for radial drilling machine. Invention Intelligence, 1980, 15(10-12), 470-471.

The new attachment gives vertical milling capability to a radial drilling machine.

607. LEE HAUSER: The maintenance audit. Plant Engineering, 1980, 34(8), 147-149.

Discusses the procedures to be followed in maintenance audit. Stresses that any maintenance audit programme should begin with a comprehensive audit of the maintenance function, followed by a compaign to correct deficiencies that are uncovered. (SS)

## MINERAL BASED INDUSTRIES

608. -----: Sheet glass-An analysis of demand. Industrial Researcher, 1980, 7(1), 39-43.

Traces the history and present status of glass industry, imports and exports of sheet glass upto 1977-78, the estimated demand and end-use pattern upto 1984. Lists the manufacturers of sheet glass and installed capacity likely to materialise by 1984. (JBS)

609. BANERJEE, H.N.: A cement policy for the eignties. Science Today, 1980, 14(1), 8-11.

610. GOURISARIA, N.: Mica industry a review. Indian Ceramics, 1980, 23(8), 163-166.

Reviews the mica industry in India, giving useful satistical dataon production and exports. Other useful data are provided on some mica products.

611. MASOOD, I. & MEHROTRA, S.P.: Rice husk ash based lime cement. Research and Industry, 1981, 26(1),4-8.

Rice husk ash, hitherto a waste, has been found to be a good source of pozzolana. The activation of lime and rice husk ash with the help of physico-chemical process developed by CBRI has resulted in a cementitious binder with appreciably good properties. This binder does not employ any scarce material and possesses properties like that of cement. The mortar with this binder: sand (1:3) is found to be about 24% cheaper as compared to 1:6 cement: sand mortar. The capital investment for setting up a small 5 tpd production unit is about ₨ 2.6 lakhs.

612. SRIVASTAVA, L.K. & WADHWA, S.S.: Advances in the manufacture of extruded clay bricks in American Continent. Indian Ceramics, 1980, 23(8), 151-158.

Gives a brief review of trends in the manufacture of extruded clay products like building bricks and other sections being practised in North American continent. Touches on various aspects, such as, production technology, storage and preparation of raw material, texturing, colouring and glazing; forming of extruded product and mechanical hacking, drying application etc. (CV)

613. WADHWA, S.S.: Charging device for small capacity lime kilns. Vishwakarma, 1980, 21(5), 19-22.

Compares the existing mechanised method, of charging kilns such as skip hoists, beltconveyors, bucket elevators etc. Describes the new systems, a simple mechanical device that can handle 5-10 TPD, indicating the advantages and ease of operation. (CV)

## ELECTRICAL INDUSTRIES

614. ANANTARAMAN, V.: Criteria for the selection of protective equipment for transformers. IEMA Journal, 1981, 1(6), 13-20.

Deals with choice of the protective equipment and the different criteria that need be applied depending on whether the equipment is located on the primary or the secondary side. (MVS)

615. BHAGERIA, S.C. et al: Anodised aluminium sheet/ foil wound transformers. Electrical India, 1981, 21(8), 17-23.

616. BOSE, T.K.: High voltage testing transformers. Electrical India. 1981, 21(8), 5-8.

The high voltage testingtransformers commonly manufactured are similar in construction to power transformers with elaborate cooling ducts. Consequently the size of these transformers are large and they are costly. The size and cost of these transformers can be substantially reduced by adopting a construction similar to voltage transformers and a further cost reduction is possible, if cascade arrangement is used for higher voltage.

617. JAIN, T.C.: Economic evaluation of transformers. Electrical India, 1981, 21(8), 9-12.

Some of the major factors which affect the overall cost (the initial cost and the operating cost) of the transformers are given.

## ELECTRONICS INDUSTRIES

618. -----: Alphanumeric keyboards. Electronic Products Magazine, 1980, 23(7), 57-59.

Briefly explains the typical basic operation of the various types of key switches along with the diagrams. Gives the list of manufacturers of alphanumeric keyboards. (VVR)

619. -----: Product focus - Logic analyser - Electronic Engineering, 1980, 52(642), 172,173,175,179,180, 182, 184,188,193,194,196,199,203.

Gives the trends, uses, performance specifications and problems of various types of logic analysers. Also gives the various logic analysers and their manufacturers. (VVR)

620. -----: Technology focus: Video discs - a triquetral market place. Electronic Engineering, 1980, 52(642), 129,131,133,136,138,142,145,149,152,156,161,165.

The video disc is the most important consumer electronics development since the introduction of colour TV. Describes the constructional details, optical principles, mastering etc., of two types of discs namely CAV (constant angular-velocity) and CLV (constant linear velocity) discs. Briefly explains the JVC & RCA Video disc players. Also explains the VLP (Video Long Player) with block diagram. (VVR)

621. BARKET, J.R.: The potential of the biochip. Invention Intelligence, 1981, 16(5), 224-229.

Semiconductor technology has brought microelectronics to the stage where the size of individual transistors on a chip approaches that of large molecules in cellular material. It is reasonable to suppose that the scale will soon be small enough for us to design circuits capable of organizing themselves into simple form forms of artificial intelligence. Coupled with newly developed techniques for implanting probes in living material, they might simulate biological systems and even be capable, to some degree, of repairing them.

622. BOLTZ, C.L.: Microelectronics: the opening door. Invention Intelligence, 1980, 15(7), 292-296.

Over the past decade or so, the technology of electronics has changed almost beyond recognition. Electronic systems have shrunk to small fractions of their original size and cost and their reliability is now almost taken for granted. Their components are systems in themselves, through the evolution of what we have come to call microelectronics. One such component is the microprocessor.

623. CHOPRA, R.C et al: Small scale sector in Electronics: Appraisal, prospects and policies. Electronics Information & Planning, 1980, 8(2), 71-92.

Analyses the performance of the small scale sector in the various sectors of the electronics industry and discusses the problems faced by this industry. Suggests a policy package to make the operations of small scale sector more meaningful in the coming decade. (VVR)

624. CHOPRA, R.C.: **Flat** panel television receiver: Development criteria and competing technologies. Electronics Information & Planning, 1980, 7(8), 517-532.

Summarises the development criteria of flat panel TV receiver and the use of electroluminescent, gas-discharge and passive displays in development of flat panel TV sets. Highlights the factors governing the market penetration of flat panels. Gives the estimations about the world market for flat panel, strategy for its market acceptability and implications of such development. (VVR)

## SENDOC Services

Featured in this section are technical enquiries that were received and the services rendered by SENDOC during the month of October, 1981. The charges for short technical enquiries will be ₨ 5/- to ₨ 10/- per typed page. Industry profiles already available with SENDOC are charged at the rate of ₨ 10/- each.

| S.No. | Enquirer | Service Rendered |
|---|---|---|
| 1. | Ent. - Andhra Pradesh | Profiles on: Cinema arc carbon, Sisal fibre, Kattai and bunwar leather, Microcellular soling, Handmade paper, Bread and biscuit unit, Writing ink, Fluorescent tube, light chokes, Napthalene balls, Office gum paste, Mini cement plant, Distilled water for battery charging, Tin containers, Rolling shutters, Battery plates, Poultry farm, Type foundry. |
| 2. | Ent. - Bihar | Profiles on: Bleaching powder, Synthetic detergent powder. |
| 3. | Ent. - Gujarat | Profile on: PVC conduit pipes |
| 4. | Ent. - Karnataka | Profiles on: Mini cement plant, Vitreous enamelware, Biscuit and bread unit, Confectionery.<br>Technical note on: Mini cement plant. |
| 5. | Ent. - Madhya Pradesh | Profile on: Asbestos cement pipes. |

| S.No. | Enquirer | Service Rendered |
|---|---|---|
| 6. | Ent. - Maharashtra | Profiles on: Bolts and nuts, Protein food, Gem clips, Surgical gloves, Dal mill and Nylon zip fasteners. |
| 7. | Ent. - Orissa | Profiles on: Furfural, Mini cement plant, Mini paper plant. |
| 8. | Ent. - Tamil Nadu | Profiles on: Paints and varnishes, Coumarin. |
| 9. | SI - Andhra Pradesh | Profiles on: Fibre glass, Welded wire mesh, Capacitors, Stardelta starters, Metal clad switches, Alcohol from Mahua flowers, Ginger oil.<br>Technical note on: Mini cement plant. |
| 10. | SI - Kerala | Profile on: Bread and biscuit unit. |
| 11. | SI - Orissa | Profile on: China clay washery |
| 12. | SI - Uttar Pradesh | Profile on: Stainless steel utensils. |

Note: Ent. - Entrepreneur. SI - Small Industry

# New Products and Processes

## CHEMICAL INDUSTRIES

### Aluminium Lithoplates

Aluminium lithoplates are used in offset lithography, photo offset lithography and multicolour printing of labels, calendars etc., and in all fields where the zinc plates are used. Further, in rotaprinting and duplicating machines where thick guage aluminium (0.127 mm) are used, the plates processed by this method will substitute the imported aluminium anodized plates.

The data regarding actual requirement of aluminium lithoplates are not available. However, it is estimated that by setting up indigenous production, there will be a foreign exchange saving to the extent of ₨ 3 million.

The process developed by the Central Electrochemical Research Institute, Karaikudi, Tamilnadu is based on the principle that the surface of an aluminium plate gets etched when treated chemically or electrochemically in solution containing alkali salts, chromates, phosphates, fluorides or chloride ions at suitable concentrations producing a uniformly grained surface. This is subsequently oxidized anodically in an electrolyte containing chromic acid, sulphuric acid and/or phosphoric acid. The process developed at the Institute offers the following advantages:

1. Use of zinc which is an imported material has been eliminated
2. The surface of aluminium offset lithoplates is smoothly and uniformly grained to a controlled size and depth, producing a porous structure
3. When mechanically grained aluminium plates are used, they develop a particular type of 'scum' known as 'inkdot scum' during printing. The present process has obviated this important disadvantage by a subsequnet anodizing step after graining.

4. The wear resistance and corrosion resistance are also improved;

5. The grained and used plates can be regrained and reused, if necessary.

The process has been studied on laboratory scale, 50 plates of size 24'x20'x20' have been prepared in baths of 200 litre capacity.

Lithographic aluminium plates prepared in the laboratory were put to printing trials at Coronation Litho Works, Sivakasi. The quality has been reported as good as the imported sample and better than conventional zinc plates in every respect.

All the raw materials such as chromic acid, hydrochloric acid, sodium hydroxide, aluminium sheet are indigenously available. The equipment such as rectifier, transformer, air compressors, exhaust blowers, are available in the country.

The total capital outlay for a plant capable of producing 120 plates of size 54'x48'x0.20' per day of 8 hours work has been estimated at Rs 4 lakhs. The cost of processing works out to only 29 paise per sq.ft.

## Black Nickel Coating for Solar Energy Conversion

For efficient conversion of solar energy to thermal energy, collector panels which absorb strongly across the solar spectrum (0.2-3.0$\mu$m), and emit very poorly in the infrared region ($>3\mu$m) are required. Ideally, a collector should absorb all the solar radiation and emit more through re-radiation. Although it is not possible to develop an ideal collector, a variety of coatings are being developed to provid the best possible combination of optical and thermal properties. Among them is the black nickel coating, which is very promising. When this coating is exposed to sunlight, the collector reaches a stagnation temperature of 140-150°C depending on the season, location, time of day, cloudiness, etc. Hence if water, air or organic fluids are passed at a calculated rate, hot water, hot air or organic vapours are produced which can be used for a number of applications running an engine with organic vapours, solar cookers, etc. In this context the process developed by the Central Electrochemical Research Institute (CECRI), Karaikudi, for producing selective black nickel coatings holds considerable promise.

The process consists in the use of a suitable substrate and special additives for getting black nickel coatings. CECRI has produced electroplated panels of 90 cm x 60 cm size. The coated sample has been tested by Jyoti Ltd., Baroda, for applications in producinghot water and hot air and found to be suitable. The firm is likely to take up the know-how from CECRI. Also, the Institute would be producing black panels of 2 m x 1 m size at the request of the firm.

## Hot and Cold Sachets

A stabilized gel containing about 87% water has been prepared from some easily available polysaccharides. This gel when filled and sealed in plastic (such as PVC) sachets can serve as a thermal reservior for heat and cold because of its large water content.

The gel-filled-handy sachets can be frozen by keeping for some time in refrigerator or ice box. The frozen sachets can be used for keeping food or drinks cold for hours especially when used in an insulating container. These can be conveniently used in place of ice bags.

Similarly the same sachet can be heated by keeping in boiling water for short intervals. When wrapped in a towel, one or more sachets can be used as a hot water bottle with no possibility of any trouble due to leaks. The same can be used for keeping food or milk hot for hours. The heating effect of these sachets also lasts longer than that of hot water bottle because of the slow rate of heat transfer through the gel.

These gel-filled sachets would be very handy and convenient for variety of domestic uses, especially for out-door purposes. These would also find use in hospitals and nursing homes.

The sachets are prepared according to the process developed by the National Chemical Laboratory, Poona by mixing the polysaccharide with water and pouring it in a plastic bag where it gels. The plastic bags are then sealed. 20 cm x 10 cm containing 200 gms. of material have been prepared. All the raw materials are indigenously available.

The product has been tested for use and found to be satisfactory. These types of sachets have become popular in the West and Japan. However, the market in India will have to be created, as it is a new product which is not even being imported. It is difficult to visualize the present market for such products which are substitution items against hot and cold water rubber bags and new items as regards preserving food articles-hot and cold.

The fixed capital on land, building and equipment is estimated at ₨ 35,000. The selling price of the NCL product works out to about ₨ 1.50 per sachet.

## ELECTRONICS AND ELECTRICAL INDUSTRIES

## Automatic Rainfall Recorder

The CSIRO Division of Cloud Physics has developed an automatic rainfall recorder. Coupled with a tipping-bucket rain-guage, it can register up to 780 mm of rainfall. Hence it can be left in the field for 6 months or longer.

The recorder was developed for use in the Division's cloud-seeding experiments in Western Victoria.

Its components, an electronic circuit board, a commercial cassette recorder and a battery, are built into a compact, portable metal case. Once the user has inserted the electrical lead of the tipping-bucket gauge into the socket on the side of the case, and depressed the record button, the system is set to register the first drops of rain.

When the bucket has collected 0.2 mm of rainwater, it tips, closing a circuit contact. This activates the cassette recorder which records the time of the closure on the tape. A crystal-controlled clock on the circuit board pinpoints the time of this and successive flip-flops of the bucket.

A C90 cassette is the pick of tape sizes for long recording stints because it can store 3800 such events.

The collected data can be processed by a simple desk-top computer or a larger one if the user has access to a computer terminal. An integrated circuit counter stores the total number of times the bucket tips (up to 9999), and this informatio can also be retrieved by computer.

Further information may be obtained from Dr. Warren King or Mr. David Parkin at: CSIRO Division of Cloud Physics, P.O. Box 134,Epping, N.S.W. 2121, Australia.

## Cable Fault Locator

Cable fault locator is a device to locate the exact position of faults inside multicore cables such as trailing cables, drill cables, armoured cables etc., used in mining and other industries. It can locate the short circuit fault between insulated (cores) and earth faults involving insulated core and earth conductor or protective metallic screen or armouring. There are other devices and methods for cable fault localization such as cable fault localization bridges, bridge megger, different loop tests, the operations of which are based on the principle of bridge measurement of resistance and these interpret the location of faults in terms of distance from one end involving calculations and are more suitable for long cables. The cable fault locator can pinpoint the exact position of faults without any measurement and calculation even for a short length of cables. The localization of fault is done by probing along the cable surface. The operation is based on electromagnetic theory of induction. Such type of fault locators are not being produced in the country. Since it is a new product, market for this item will have to be created. No precise data about the demand of these locators is available, but it is felt that in view of ease of operation, it will be very useful for every colliery workshop and will have a good market in the mining industries.

Investigations were carried out at Central Mining Research Station, Dhanbad, with a view to make fault locator where high technical proficiency is not necessary for the operator of the device. These investigations have resulted in a successful production of the prototype of the cable fault locator which can be fabricated from indigenously available components at a very reasonable cost. Features have been incorporated on the supply unit for identification of the faulty cores. The principle of operation of the device is based on the theory of electromagnetic induction. When a current flows through two parallel conductors in opposite directions, there is a concentration of magnetic lines of force or flux on the region in between the current carrying conductors. This is the resultant of the two series of concentric magnetic flux due to each of the the current carrying conductors. This flux is utilized in the location of the fault. The device consists of four components: (i) supply unit (ii) pick-up probe (iii) amplifier and (iv) head phone detector.

The supply unit supplies a suitable low voltage single current to the faulty core. The pick-up probe when moved along the surface of the cable from its close vicinity embraces the flux, which is magnified by the soft iron-core and develops an induced electromotive force in it. The induced electromotive force is amplified in the amplifier for feeding to the head phone detectors. When a short circuit fault exists between the cores of a multicore cable, the short circuit current takes the return path through the fault and the magnetic field exists only within the current carrying zone of the cable. When the pick-up probe is moved along the cable surface within its current carrying zone, a buzzing sound will be heard all along. The intensity of the buzzing sound will vary in a periodical manner consistent with the lay of the cores of the cables which will vanish as soon as the fault is crossed. This enables to detect the exact location of the fault. The laboratory has fabricated the prototype of the device which has been tested for its performance by them and in collieries on trailing cables for short circuit faults. It has also been tested for its intrinsic safety in the laboratory. The performance of the locator has been found satisfactory. Thedevice has now been modified. The pick up probe wound on ferrite core, the amplifier and an indicating meter in place of the head phone have been housed in a portable wooden cabinet. Features have also been incorporated for location of open circuit fault in rubber insulated non-screened cables, in addition to location of short circuit faults.

The various components used in the prototype of the device are indigenously available or can be easily fabricated. The price of the cable fault locator including the supply unit assembled from the indigenous components will be of the order of ₨ 750. Laboratory and electrical instruments manufacturers having normal production facilities will be in a position to undertake the assembly of this instrument from its components without much change in the existing laboratory or workshop.

## Radiosonde Thermistors

Radiosonde thermistors are used for measuring the temperature of upper atmosphere with the help of balloons by using radiosonde techniques. These devices thus are extremely useful in both civil and defence aviation and in meteorological forecasting. The demand for such thermistors by Indian Meteorological Department is estimated at about 80,000 dollars (Rs 6 lakhs c.i.f.)

Different metallic oxides ($TiO_2$, $Fe_2O_3$, MgO, $Al_2O_3$, Fe3O4) in definite proportions are wet ground, mixed, with a binder and extruded into rods. These rods are heated in a furnace, electrical contacts are applied to them and their resistance is adjusted. The thermistors are then annealed, wax coated and calibrated.

The process developed by the National Chemical Laboratory, Poona, has been standardized on 100 pieces/batch scale. The raw materials required are: metallic oxides, lead wire, solder, heating rods, platinum foil etc., all of which are indigenously available.

The NCL samples were tested by the Meteorological Observatory, Poona and found quite acceptable and in fact found to be more suitable for their work than the imported samples. The fixed capital on land, building and equipment is estimated at Rs 1.2 lakhs.

The price of U.S. product is about $ 2 or Rs 15/- per piece. The landed price will be about Rs 24/- per piece. The ex-factory selling price by the NCL process works out at Rs 6.90 per piece assuming production of 30,000 pieces per annum and a return of 25% on total capital.

## Sensitive Smoke Sensor

An extremely sensitive, early warning smoke detector developed by CSIRO and Telecom is now available.

A Sydney Company, Fire Fighting Enterprises (Aust.) Ltd., is marketing it under licence and British Aerospace Australia Ltd. is producing units at its Salisbury plant in South Australia under an arrangement with FFE.

A feature of VESDA (very early warning smoke detection apparatus), as the detector is called, is that, unlike other devices, it works effectively in the return air duct of large airconditioning systems.

The detector's early warning capability makes it well suited for watching over expensive equipment in telephone exchanges, computer suites, process control centres, and TV studios. It can also be used in hospitals and high-rise buildings.

A unit has been supplied to the Atomic Energy Commission at Lucas Heights, N.S.W. and some of the 60 units ordered by Telecom for installation in telephone exchanges have arrived at regional offices.

Those to be used in Telecom's high-rise telephone exchanges will be linked with the building's computer-controlled supervisory system which monitors and controls all of the engineering services including the emergency power plant.

The supervisory system will log the operation of VESDA units in the return air supplies from equipment areas and present the supervisor with information on a TV monitor in the control centre.

After an initial trial period of 4 months, Telecom engineers will set the detection limits of all units so that they provide maximum fire protection to the expensive communications equipment - especially during after-work hours when it is not manned and to reduce to a minimum the number of false alarms.

They hope to establish during the trial the amount of dust in excess of the normal background level in the rooms that would be likely to occur with everyday activities such as installing equipment, vacuum cleaning and pulling in cables. If the detection limits are set too low, these actions would lead to false alarms.

VESDA operates by using a xenon flash lamp to measure the scattering of light produced by minute particles of smoke or dust.

A photomultiplier detects the scattered light and produces an electric signal. The size of the signal depends on the degree of scatter, and hence on the amount of smoke.

A dual beam system is used to allow for pollution in city air drawn into the building from outside as this is usually high enough for the instrument to register a signal. One beam monitors air flowing from the equipment areas, and the other monitors air drawn from outside the building.

The instrument's electronics circuitry compares the light scatter from the two beams and registers a signal when a pre-determined difference is detected. Air cleanliness is monitored continuously, and a set of warning lights indicates any departure from pre-set levels of detection.

VESDA was invented by a former CSIRO scientist, Mr. David Packham and a former Telecom fire protection officer, Mr. Len Gibson. Mr. John Hamilton of the Division of Mineral Chemistry and the Telecom Research Department advised British Aerospace Australia Ltd., during the development of the production version.

Telecom's placement of purchase orders and a research and development contract with FFE provided the impetus to commercial realization of the project. FFE has already received a great deal of interest in the detector both from within Australia and from overseas.

For more information: Fire Fighting Enterprises (Aust.) Ltd., P.O. Box 2, Ermington, N.S.W. 2115, Australia.

## MINERAL BASED INDUSTRIES

### Cordierite-Based Saggars

Saggar is used for firing ceramic ware in industrial kilns to protect the ware from the ill-effects of direct firing. Presently, one only-based saggars are being used by the pottery industries.

The present annual consumption is estimated at about 10 lakh saggars of various sizes, which is met by production of clay-based saggars at the pottery site itself. The cordierite-based saggars are likely to have better sale potential by virtue of their improved performance. The cost of the clay-based saggars varies from Rs 5/- to Rs 10/- per piece depending upon the outer diameter ranging between 20 cm and 30 cm.

The process for manufacture of cordierite saggars consists of preparation of batch, calcination, grinding, grading, mixing and shaping by pressing/jiggering. The pressed shapes are fired and finally inspected. The saggars thus produced posses a service life of at least 30 firing cycles, as against the average life of 5 to 6 firing cycles of presently used saggars

The main raw material is cordierite which is available indigenously.

The main equipment required are ball mill, filter press, jaw crusher, sieving machine, drier, saggar press, mixer, furnace, pyrometer, weighing machine, etc., all of which are indigenously available.

Pre-design cost data (Basis 250 saggars/day)

| | |
|---|---|
| Land and building | Rs 3.50 lakhs |
| Plant and machinery | Rs 12.19 lakhs |
| Working capital | Rs 2.51 lakhs |
| Cost of production | Rs 17/- each (30 cm dia) |

The saggars produced in the Laboratory of the Central Glass & Ceramic Research Institute, Calcutta were tested at large potteries and insulators, and found to be very satisfactory.

### Steel Fibre Reinforced Concrete (SFRC)

Conventional concrete, a cement based matrix, when subjected to tensile stress system or impact loading is observed to exhibit brittle type of failure. It is now well established that the tensile strength, toughness and ductility may be significantly improved by the introduction of fibres in the concrete mix. There has been a growing interest in adopting this technology of fibre reinforced concrete in construction industry.

Steel fibre reinforced concrete (SFRC) is a composite material which essentially consists of conventional concrete or mortar reinforced by random dispersal of short, fine steel fibres of specific geometry. These fibres act as crack-arrestors, restrict the development of cracks and thus transform an inherently brittle material, with its low tensile strength and impact resistance, into a strong composite with superior crack resistance, improved ductility and distinctive post-cracking behaviour prior to failure.

Different types of fibres have been tried to reinforce concrete, such as that of steel, carbon, asbestos, vegetable, polypropylene and glass. In general, all these types of fibres can be classified into two basic categories: those having a higher elastic modulus than the cement matrix (called 'hard' intrusion) and those with lower modulus (called 'soft' intrusion). The properties of the fibre reinforced concrete are very much affected by the type of fibre. Low modulus fibres, like polypropylene and vegetable fibres improve the impact resistance of concrete considerably, but these do not contribute much towards flexural strength. On the other hand, high modulus fibres like carbon, glass and steel fibres improve both the flexural and impact resistance simultaneously. Considering the importance of concrete in construction and in view of its weakness in tension against impact, it is appropriate to state that of all the fibres, steel fibres are probably the best suited for structural applications.

It is now established that SFRC possesses improved characteristics of crack resistance and ductility, impact resistance, shatter/spalling resistance, abrasion resistance, flexural strength and fatigue resistance. It also has the capability to support substantial loads after cracking.

Owing to the advantages SFRC offers, it is coming to the forefront in such major areas of special applications as shown in Table 1.

Keeping in view the extensive work already carried out on other types of fibres, Cement Research Institute of India concentrated the R&D investigations on the use of steel fibres only. It was realized that one of the major difficulties in using steel fibre reinforced concrete was the non-availability of steel fibres in the country. In view of this, CRI developed and fabricated a fibre forming machine which can automatically produce steel fibres of various shapes, sizes and aspects ratios. The machine can handle wires in the diameter range of 0.3 to 1.0 mm. Another pre-requisite for using steel fibres in concrete mix was denesting and uniform feeding the individisteel fibres into the concrete mixer. This was accomplished by developing a fibre dispenser (called 'Denester'). This denester dispenses the fibres into the concrete mix at a predetermined feed rate. As a part of this study, the effect of size, shape, aspect ratio and volume fraction of the fibres on the workability of concrete in the fresh state and the flexural strength in the hardened state were investigated. Four commercially viable shapes of fibre were used in this study. The aspect ratio of the fibres considered ranged between 50 and 100; the volume fraction of fibres in concrete varied between 1.0 and 3.0 percent. Other physical properties of SFRC investigated included first crack flexural strength, ultimate compressive strength, impact strength, and behaviour under cyclic loading. Significant improvements obtained in SFRC vis-a-vis conventional concrete are given in Table 2.

### AREAS OF APPLICATION OF SFRC

| Insitu Placement | Present Products | Composite Constructio |
|---|---|---|
| 1. Hydraulic Structures | 1. Manhole Covers | 1. Temporary form work finally becoming integral part of the structural element |
| 2. Defence Installations | 2. Concrete Pipes | 2. FRC skin for protecting concrete in marine environment in: i) Bridge girders, ii) Pile foundations |
| 3. Tunnel Linings | 3. Building Components | 3. Building components |
| 4. Overlays for Airport Pavement | | |
| 5. Industrial Floors | | |
| 6. Overlays/Wearing Coat for Bridge Decks | | |
| 7. Overlays for Highway Pavements | | |
| 8. Reapir Work | | |

Limited durability tests indicate that uncracked specimens when exposed to aggressive agencies have retained their strength and load deformation characteristics.

## IMPROVEMENTS OBTSINED IN SFRC

| Property | Improvement Over Plain Concrete |
|---|---|
| First crack flexural strength | 150% |
| Ultimate compressive strength | 125% |
| Impact resistance | 650% |
| Flexural fatigue endurance | 225% |

SFRC as composite material has potential for its use in protecting concrete structures in aggressive environment. The important properties of SFRC-skin, eg, increased ductility and cracking resistance could be employed for effective utilization of this material in composite constructions. It can be used as an integral part of structural member in the tension zone to improve the service performance of such members for fulfilling the condition of serviceability limit state.

Although SFRC appears costlier when directly compared with conventional concrete, but substantial benefits will result like reduction in section, improved and longer service, less downtime for repairs, when the intrinsic improved properties of the material are taken advantage of in the design. When all these direct and indirect benefits are taken into consideration and a cost-benefit analysis made, it is expected that SFRC would very favourably compare with conventional concrete.

In order to establish the practical feasibility of field application of fibre reinforced concrete and also to establish its performance, CRI in collaboration with the International Airports Authority of India, has laid three pavement slabs in a jet bay at Delhi Airport. This also provided an opportunity to tackle field problems relating to handling and dispensing of fibres into the concrete mix; and also the mixing, handling, placing and compaction of SFRC in Indian conditions where the concreting operations are essentially labour intensive.

Out of these three slabs, one slab was of conventional concrete with a design thickness of 400 mm laid over 150 mm water bound macadam (WBM). The second was laid with full depth SFRC of 300 mm thickness and a third slab of similar thickness was laid with SFRC at top and bottom edges of the slab. Although the theoretical calculations indicated that the pavement thickness can be reduced upto 40%, the actual reduction provided was only to the extent of 25% mainly to ensure common subgrade pressure conditions. The performance of these slabs which are subjected to full parking load of jumbo aircrafts has been good.

CRI has now become pioneer in the field of SFRC technology in India and has acquired the capability of dealing with SFRC in field conditions on large scale concrete constructions. CRI is also now considering the use of SFRC in wearing coat of bridges and in defence installations.

## Tamping Machine for Lime Concrete Terracing

Lime concrete terracing is still considered an effective and cheaper treatment for the thermal insulation and also for water proofing the flat roofs. Better results from such a treatment are obtained only when the lime concrete is properly tamped after its laying on the roof. Manual tamping is the only system of compaction for these terracings followed till today. But this system suffers from several drawbacks and hence does not ensure proper tamping of lime concrete. A few major drawbacks of the manual tamping system are:

a) The quality of manually tamped terracings is in general not upto the mark due to inadequate tamping. The resulting finish is also often poor.

b) Uniformity in tamping is not ensured because of different workers tamping with different number of stocks and force.

c) The output is low because manual tamping is a slow process.

d) The process of manual tamping is becoming costlier with rising cost of labour.

With a view to mechanise the process of tamping lime concrete terracings, a machine has been developed at the Central Building Research Institute, Roorkee. Much better results have been obtained by tamping with the machine.

The main object of developing the machine has been to ensure proper tamping of lime concrete terracings by providing uniformity in tamping force and also imparting considerably large number of impact blows per minute. The other object of the machine is to increase the tamping rate so that its use becomes more economical in comparison with manual tamping.

The machine works on the principle of cam and follower mechanism. The follower is allowed to rise and drop down suddenly with the help of a rotating cam. As the tamper is attached to the cam follower, when the latter drops down, the tamper also falls along with it thereby giving an instantaneous blow on the lime concrete below it. Such repetitive blows are obtained as the cam rotates. This way, the lime concrete is compacted.

The machine has three identical tamping units, each comprising a cam and follower mechanism anda tamper. These units are mounted on an angle iron chassis. The three cams (one for each tamper) are mounted on one shaft which is rotated by a half hor power electric motor (or a petrol engine of two horse power). The entire machine may be moved forward and backward on two rollers provided below the chassis. A longhand has been provided with the machine to move it easily. Since the machine weighs about 70 kg, it can be transported to any level without difficulty. The size of the machine is length 500 mm, width 430 mm and height 300 mm excluding the handle.

Though the machine can tamp a terracing of about 50 sq. metre in one hour, its output has been rated at 240 sq. metre in two days because of the fact that a terracing is required to be tamped in several rounds of the machine and also machine tamping has to be done for atleast two days to achieve satisfactory results. The 'bel' and 'Gur' water should be used quite sparingly to retard chemical reaction between lime and surkhi. This helps in compaction and also provides the terracing with a well finished top.

An estimate has been prepared for finding out the tamping charges with the machine. The market price of the machine (electric motor type) has been taken as ₨ 2,500/- for the preparation of estimate. Tamping charges with machine come to ₨ 2.00 for 10 sq. mtr. of terracing.

The lime terracings prepared by this machine were tested for bulk density and water penetration. It was found that the machine-made terracings were superior to the conventional hand-tamped ones in density as well as in resistance against water penetration.

# New Machinery and Equipment

## CHEMICAL PLANT MACHINERY AND EQUIPMENT

### Blow Moulding Machines

The Ahura blow moulding machines are available in different capacities such as the 1-litre machine which is known as the 'Baby' blow moulding machine, and 2-litre, 3-litre, 5-litre and 10-litre machines.

Machines up to 5-litre capacity incorporate pneumatic mould clamping and those beyond the 5-litre capacity are provided with hydraulic mould clamping.

These machines are ideal for making pharmaceutical, cosmetic and shampoo bottles, toys, balls, milk bottles, water bottles, paint, gum and ink bottles, containers for packing fertilizers insecticides and jerry cans and they have found use in various companies all over India.

Separate timers for parison length control and blowing time as well as solid state temperature controllers form a part of the standard equipment for all machines.

Also available: Injection moulding machines of 20 gm, 90 gm and 126 gm capacity in both plunge type and screw type.

| Specifications | 1-litre | 2-litre | 3-litre | 5-litre | 10-litre |
|---|---|---|---|---|---|
| Plasticizing capacity (kg/hour) | 10 | 15 | 30 | 40 | 50 |
| Max. mould size width x height (mm) | 190x190 | 225x225 | 300x300 | 300x355 | 355x400 |
| Max.mould thickness (mm) | 150 | 225 | 275 | 250 | 325 |

| | | | | | |
|---|---|---|---|---|---|
| Screw drive motor (HP) | 3 | 5 | 7.5 | 10 | 15 |
| Heater capacity (KW) | 2.5 | 3.2 | 5 | 9 | 12 |
| Screw diameter (mm) | 30 | 38 | 45 | 50 | 60 |

Special Features:

- Fast, fully automatic operation
- Consistent quality of output piece after piece-no need to rely on operator's skills or moods
- Special alloy steel screw and barrel
- Screw plasticization for direct dry colouring
- A rugged clamp ensures flash-free mouldings. Locking pressure builds only after mould faces touch each other, hence mould damage due to hammering is non-existent.

Manufactured by Ahura Industrial Engineers, Bombay-400 062
Selling Agents: PMT Machinery & Engineering Exports Company Pvt Ltd, Bell Building, Sir P.M. Road, Bombay-400 001.

## pH Sensor for Plastic-Lined Pipes

A new pH sensor designed specifically for monitoring streams within plastic lined pipes has been introduced by TBI. Designated model 555, the sensor consists of a solid state reference cell and all necessary components for installation. The sensor body and its mounting disc are of Kynar construction. A steel backing flange is also furnished to provide mechanical integrity for mounting to a process pipe. The patented (Pat. No. 4, 112 352), TBI solid state reference cell embodies a configuration which reduces the harmful effects of temperature and pressure inherent to the process steam, substantially extending sensor service life. A selection of glass electrodes available for use with TBI's mode 555 sensor covers the pH range from 0 to 14, and temperature from 0 to 140°C. An integral thermo-compensatory may also be specified.

Further details, contact: Jost's Engineering Co. Ltd., Great Social Building, Sir P.M. Road, Bombay-400 001.

## Ultrasonic Flowmeter

Encon Systems, Madras have developed a new "Dynasonic" ultrasonic flowmeter designed to measure the velocity of slurries and liquids.

The Dynasonic flowmeter works on the principle of the Doppler effect. The Ultrasonic flowmeter consists of a single transducer, transmitter and interconnecting cable. The single transducer which is mounted on theoutside of the pipe contains twin crystals encapsulated in an epoxy housing. One crystal is a transmitter and the other a receiver. The transmitting crystal emits a continuous ultrasonic pulse or frequency into the liquid stream, which when reflected from within the liquid provides a signal to the receiver.

When the liquid is stationery, the reflected signal is received at the same frequency as transmitted. When the liquid is moving, the received signal is altered in frequency due to 'Doppler Effect'.

The instrument measures the difference in the transmitted and reflected frequencies which is proportional to flow velocity and provides a linear 4-20 mA output, a velocity indication as well as an optional digital totalizer.

The great advantage of this flowmeter is that being noninvasive it can be installed quickly, easily and inexpensively. Besides the panel mounted model, a portable model is also available for spot checks and survey instrumentation of flow rates, which can be carried to each metering location and used on any pipe size above 1" diameter.

For further details contact: Encon Systems, 267, Kilpauk Garden Road, Madras 600 001.

## ELECTRONICS AND ELECTRICAL EQUIPMENT

### Insulation Tester

The Insulation Tester EBM 112* is a self contained portable instrument providing the electrician a tool with which insulation measurement can be carried out. It is also intended for industrial usage, technical institutions, laboratories, motor manufacturers, etc. It employs TOUCH & READ operation; hence no cranking or adjustments are required. Incorporated with rugged elegant meter having $4\frac{1}{2}$" scale length and with unbreakable ABS resin casing, it is available in any one of test voltages of 100, 250, 500 or 1000V DC.

Specifications:

a) **Test Voltage** : 500V DC
**Range** : 0 to 100 Megha ohm and infinity

Centre scale : 10 Mega ohm
Accuracy : ± 5% at Centre Scale
Batteries : 6 Nos of 1.5 volts each (eveready 915 or equivalent)
Dimensions : 18 x 11 x 8 cms
Weight : 1.3 Kg
Accessories : A pair of Test Prods; leather carrying case at extra cost

b) Test voltage : 100 V 250 V 1000 V
Range : 0-200 M 500 M 2000 M
Centre Scale : 2 Mega ohm 5 Megha ohm 20 Mega ohm

Further details from Electronics & Business Machines Private Limited, 11-7 Instronics Campus, Tiruvanmiyur, Madras 600 041.

## Single Plane Vibration Monitor

Vibration monitor (model 3000 IPR/PS) is a simple vibration monitoring machinery protection instrument complete with inherent power supply and relays with alert and danger limit settings. The instrument has proximeter sensor which provides an accurate and perfectly stable and linear transducer system. The Vibration monitor provides a continuous measurement and monitoring of the radial vibration probe proximeter signal input.

The probe is a simple stainless steel threaded body with two locknuts. It is mounted radially along a machine shaft, at or near a radial bearing. The probe has an inherent screened co-axial cable with one straight connector near the body. The other end of the cable has a BNC connector, which has to be coupled to the promixeter. The proximeter is the vibration transducer which is housed in a sheet metal casing. The BNC receptacle is provided to receive on the screened cable of the probe. While the voltage involved is in the safe and static operation limits, it is suggested to mount the proximeter inside an explosion-proof box in case explosion safety precautions are required.

Screened cable (2 core) is to be connected between the proximeter and the instrument.

The vibration monitor has a panel mounting provision. The supply voltage is 230 V, 50 c/s A/C. The required power supply is incorporated within the instrument in the model 3000 IPR/PS.

The vibration is indicated in the vertical edgewise meter. The O.K. light provides the range of linear distance in the proximity gap.

The gain control potentiometer at the back of the instrument provides for adjusting the gain of the output to the meter. The push button on the front panel can be used to see, when pressed, the value of the alert or trip danger levels while the set potentiometers are provided at the back panel. The entire circuit is accommodated in a single board with easy serviceability. The circuit has full solid state and integrated circuit technique to enhance the reliability and stability on measurements. The design is such as to ensure high signal conditioning accuracy and alarm stability.

A fixed time delay is provided before the relay of the Alert and Trip conditions could operate to assure the conditions truly represented.

Recorder output provision is given for continuous recording requirements. For all high speed/rotary machines, vibration supervision is constantly effected by this Pie monitor model 3000 IPR/PS.

For further details on vibration problems contact: Precision Instruments and Electronics, 4, Patullos Road, Madras 600 002.

## Transistor Analyzer

New types of transistors and FETs are being introduced every day. Some, eventhough still classed as transistors, resemble an integrated circuit in that they contain protective diodes and/or Faraday shields. Still others are so sensitive that even a few microamps of base current will cause them to saturate. Model EBM 911 is a complete transistor analyzer in or out of circuit, and it facilitates easy to use, accurate test for these newer types of FETs, including the difficult to test enhancement type MOSFET.

Application: Accurate measurement of parameters of all types (RF, IF, Low, Medium & High Power) of transistors Beta (DC & AC). ICBO, ICEO & ICES....FETs-Gm, IDSS & IGSS....UJTs, IEB$_1$S....SCRs, IAKO, IAGO & IKAO......selection of matched pairs of transistors, FETs, diodes including Darlington pairs...... also tests diodes, zeners, varicap diodes & TRIACs.

Specifications:

Transistor Tests: In or out of circuit for gain. Leakage tests by out of circuit. Gain measured as good or bad/Beta

| | | | | |
|---|---|---|---|---|
| Gain | : | BAD<br>0-5 | - ?<br>5-10 | - GOOD<br>10-500 |
| Leakage | : | 0-2500uA | | |

Field Effects Transistor Tests: In or out of circuit for gain. Leakage test by out of circuit. Gain measured as good or bad/ Gm (transconductance). IDSS Zero Bias Test measured in mA for industrial culling & power amplifier matching

| | | | |
|---|---|---|---|
| Gm : | BAD - | ? - | Good |
| | 0-250 | 250-500 | 500-25000 |
| Leakages IGSS : | 0-2500uA | | |
| Zero Bias Drain Current IDSS : | 0-50 mA | | |

Damage Proof: Guaranteed not to damage transistor, circuit or tester at any time

DC out of circuit test : Erratic tests or transistors that have a built-in diode in them should be checked out of circuit on DC only for greatest reliability. Simply double check a transistor before you replace it on DC out of circuit and these will be caught. These are only a few, out of 20,000 and are generally in the RF Circuits.

Power Supply : 200 - 250V AC, 50 c/s

Dimension : 19 x 15 x 16 cms

Weight : 3 kg

Accessories : Test prods (4 Nos)

Transistors & FETS Reference Book supplied free of cost which consists of over 20,000 types including the base diagram.

Further details from Electronics & Business Machines Pvt. Ltd.
II-7, Instronics Campus, Tiruvanmiyur, Madras 600 041.

## ENGINEERING EQUIPMENT

### Automatic Wire Hanger Machine

This machine has been designed for the fully automatic production of wire coat hangers. It can process galvanized wire (2.0 - 2.9 mm dia.), but its principal function is to form hangers out of PVC-coated wire (2.0 - 3.2 mm dia.). The capacity of the machine is 2,800 resp. 2,700 pces/hour. The machine can produce a wide variety of hangers of attractive colors and sizes. A special mechanism is used for body forming to produce a hanger of uniform finish without kinks or bends.

The vinyl coating will not be torn and the interior wire will not protrude. The machine can be operated even by unskilled workers. Because of its versatility, hanger styles and dimensions can be easily varied to meet specific customer requirements. The double feed roller construction minimizes slip fluctuations due to reductions in wire clamping pressure, changes in temperature and wire properties, and other factors. During the body forming process, the neck forming arm and hook center roller withdraw toward the panel surface. In this way, the wire is kept upright and the finished product is free from kinks and bends. A particular advantage of this machine is the electrical clutch in the wire feed mechanism. A sensor enables precise control of wire length, eliminating non-uniformity and increasing operating efficiency. An electrical counter measures the production output and sounds a buzzer when the preset quantity is reached. The twister spindle is of spline design and rotation is by spiral bevel gear to reduce noise. The wirefeed carrier has a capacity of 1,000 kg to reduce downtime, prevent wire loss and increase production. A limit switch stops the machine in case of trouble such as wire entanglement.

Manufacturer: Shin-Ei Kogyo Co., Ltd., P.O. Box 20, Itami 664-91, Japan

## Centreless Grinding Machine

GN 63 Centreless grinding machine is a precisionggrinding machine designed and developed in CMTI. It is suitable for both throughfeed and infeed grinding. Work pieces can be ground to circularity values of less than 0.011 mm and cylindricity values within 0.002/200 mm.

The regulating and grinding wheel slides are designed to move towards the fixed workrest, providing a fixed centre line for workpiece. This simplifies work loading and facilitates interconnection of several machines for line grinding.

Both the spindle units are totally enclosed cartridges and can be put into or lifted out of the machine as complete assemblies The system of mounting of grinding wheel is also considerably rationalised. The spindles are dual supported in high precision double row cylindrical roller bearings, giving high rigidity and eliminating all spring back tendencies in the grinding gap. The grinding wheel spindle is driven by a motor through a splined torsion bar relieving grinding wheel of all belt tensions. The regulating wheel spindle is driven through gear box and splined torsion bar. Alternatively infinitely variable thyristor controlled D.C. drive can be provided for the regulating wheel. The regulating wheel head can be tilted by +8° for throughfeed grinding and its slide can be swivelled through +4°.

The infeed to the grinding wheel is against a fixed stop to give high repetitive accuracy on the size of the workpiece ground. The position of fixed stop can be precisely adjusted using scales graduated in 0.001 mm. The work rest support, fixed in lateral position to give a constant centreline can be adjusted vertically and clamped in any position. Hydraulically operated dressing devices with infinitely variable feed control and capable of dressing cylindrical, taper and profiled forms are incorporated. All controls to the machine are so provided as to permit convenient handling from a single position.

The machine is provided with precision machined V and flat guideways for both the wheel slides and manually controlled plunge feed cycle. Alternatively rolling guideway for the grinding wheel carriage and electro-hydraulically controlled automatic plunge grinding cycle can be provided. The machine is designed to take up work handling devices and other accessories as and when required. Provision also exists to extend the maximum grinding capacity upto 100 mm diameter with suitable modifications.

The machine is now available to industry for manufacture under licence from the Central Machine Tools Institute, Bangalore.

Main Specifications (All dimensions in millimeters)

| | | |
|---|---|---|
| Max work diameter | 63 | 63 |
| Max work length for infeed grinding | | 200 |
| Grinding wheel | | 400 x 200 x 303.2 |
| Regulating wheel | | 300 x 200 x 160 |
| Regulating wheel speeds, RPM | | 12-250 |
| Grinding wheel drive, kw | | 11 |
| Weight (Appx.) kg | | 3000 |

### Hand-operated Wire-Cutting Machine

United Industries, Jamnagar, manufacture hand operated wire-cutting machines. The machine is able to cut any type of material such as iron/brass/copper/aluminium. Cutting range extends from 1 mm to 4 mm diameter. The machine is also recommended for cutting the wire in length from 5 mm to 60 mm. The weight is approximately 1,650 g.

For further information write to: United Industries 57 Digvijay Plot, P.O. Box 5026, Jamnagar, Gujarat 361 001.

### Tiles Press

Prakash Fabricators have developed for the first time in India a compact hydraulic unit for manufacture of tiles at high speed.

It delivers one fully compressed tile at the rate of just 15 seconds each with the strength of a stone, and saves 80 per cent on labour, power andenergy.

This is a fully fabricated unit having hydraulic pump, run by two H.P. motor and necessary operating lever in the hands.

All such plants, except the imported ones, are running on piston pumps, accumulator and presses consuming a lot of space and involving large investment. This unit occupies relatively small space and provides manoeuvrability.

Its profitability is very high and will be a boon to small units in rural and urban areas, creating job opportunities for the unemployed.

For details please write to Prakash Fabricators, P.B. No. 207, 1034, Rajaram Road, Kolhapur, Maharashtra.

# Industry Roundup

This section highlights policies and procedures, guidelines, the present status and future prospects in certain industries as well as the latest available data in respect of such industries.

## COCONUT AND COCONUT OIL INDUSTRY IN INDIA

### Introduction

Coconut palm is one of the important tree crops of the world. Practically every part of the tree yields useful products to mankind. But inspite of its varied uses and the impact of the crop on the economy of the region where it is grown, scientific research was initiated only from 1916 onwards.

India was the first to take up systematic and scientific research in coconut crop. Research work was initiated in Kasargod and Nileshwar (in Kerala) as early as in 1916 and Kasargod station has now become the headquarters of the Central Plantation Crops Research Institute set up in 1970. Since coconut is grown not only in Kerala, but in other parts of the country too, like Karnataka, Tamil Nadu, Orissa, Assam and West Bengal, an All India Coordinated Project for the improvement of coconut crop was sanctioned by the Indian Council of Agricultural Research (ICAR) in 1971. The Institute has tried to develop crop combinations and cropping systems that would increase production of coconuts substantially.

### Production of Coconut

As could be seen from the Table I about 95% of the total production of coconut in the country is accounted for by the four states of Kerala, Karnataka, Tamil Nadu and Andhra Pradesh.

The production of coconut which was 4224 million nuts in 1955-56 increased to the level of 6124 million nuts in the year 1971-72 declined to 5471 million nuts in 1978-79, Thus, the net increase by 1978-79 over the base level of 1955-1956 was only 30%. In 1971-72 the additional production over the level of 1955-56 was 1900 million nuts of which 955 million (50%) was in Kerala State, 282 million (15%) in Karnataka and 559 million (30%) in Tamil Nadu. But surprisingly, on the assumption that the official figures of production are reliable, the additional increase recorded in Kerala was completely wiped out in the subsequent years and by 1978-79 the production level reached a point which was even lower to that existed in 1955-56. Contrary to what happened in Kerala, the tempo of increase was maintained in both Karnataka and Tamil Nadu till 1978-79. In Karnataka the increase was by 129% over the 1955-56 level and in Tamil Nadu it was by 153%. In other states too, the increase in area observed was followed by a proportionate increase in the production. The Table I will further show that by 1978-79, of the total increase in the production of 1246 million nuts from the 1955-56 level, Karnataka and Tamil Nadu together accounted for 88%, whereas; the contribution of Kerala State was nil.

## Table I

### Production of Coconuts in India (in million nuts)

| Year | Kerala | Karnataka | Tamil Nadu | Andhra Pradesh | Others | Total |
|---|---|---|---|---|---|---|
| 1970-71 | 3981.0 | 731.8 | 941.5 | 157.0 | 263.7 | 6075.0 |
| 1971-72 | 4054.0 | 637.7 | 976.6 | 167.3 | 288.1 | 6123.7 |
| 1975-76 | 3439.7 | 766.6 | 1098.6 | 167.4 | 357.1 | 5829.4 |
| 1976.77 | 3348.0 | 802.8 | 1094.9 | 162.4 | 357.2 | 5765.3 |
| 1977-78 | 3053.0 | 810.2 | 1038.9 | 166.6 | 343.9 | 5412.6 |
| 1978-79 | 3075.4 | 813.2 | 1056.6 | 168.5 | 357.1 | 5470.8 |

## Production and Availability of Coconut Oil

The major commercial products of coconut crop are the milling copra and the resultant coconut oil. The quality of coconut is best in Kerala and traditionally, coconut is processed into milling copra for commercial activities. The other areas, because of necessity forced by location, engaged in the manufacture of copra are Lakshadweep Islands and Andaman and Nicobar Islands. But these areas account for only 5% of the total production of milling copra in the country whereas Kerala State alone accounts for the balance of 95%. The coconuts produced in Karnataka, Tamil Nadu and Andhra Pradesh are mostly used as water and dry nuts and a portion converted into ball copra for edible purposes in the non-producing states. In other states, such as, Maharashtra, Orissa, West Bengal and Assam over 50% of the produce is harvested as tender nuts for marketing in the nearby cities for drinking purposes and the remaining half utilised for consumption in households and also for religious offerings.

The production estimates of coconut oil for different years as reported by the oil mills in India, the imports of coconut oil and the total availability in the country are given in Table II. The mills are likely to under report the figures to avoid cess and sales tax. But this phenomenon would have continued all through the years except when there was emergency which is very much reflected in the figures for 1975-76 and 1976-77.

The internal production of coconut oil on the basis of the annual returns submitted by the oil mills ranged between 100 and 130 thousand tonnes annually. This had been the case right from 1955-56 onwards till 1978-79. The estimates developed by adopting accepted norms arrived at on the basis of survey enquiries and AMA reports also revealed stagnation in the annual production of coconut oil during the same period, though the estimates were higher as could be seen from Table III. The table will show marginal increases in production after 1975-76, but are not significant and could not be explained. The fact that irrespective of the basis adopted and the consequent changes in the estimates, there was no perceptible change in the production of coconut oil in the country during the period from 1955-56 has to be accepted.

## Table II

### Production of Coconut Oil in India as per Cess Returns

| Year | Coconut Production | Import of Coconut Oil (excepting copra import) | Total Availability |
|---|---|---|---|
| 1970-71 | 98438 | 1470 | 99908 |
| 1971-72 | 96979 | .. | 96979 |
| 1972-73 | 98438 | .. | 98438 |
| 1973-74 | 92813 | .. | 92813 |
| 1974-75 | 91459 | .. | 91459 |
| 1975-76 | 131250 | .. | 131250 |
| 1976-77 | 121042 | 52 | 121194 |
| 1977-78 | 95000 | 20732 | 115732 |
| 1978-79 | 109063 | 3793 | 112856 |
| 1979-80 | *79713 | N.A. | 79713 |

N.A. - Not Available *Provisional Figures

## Table III

### Estimated Availability of Coconut Oil in India

| Year | Estimated indigenous production of coconut oil | Import of copra in terms of oil | Import of coconut oil | Total |
|---|---|---|---|---|
| 1970-71 | 179549 | 10763 | 1470 | 191787 |
| 1971-72 | 180986 | 6408 | .. | 187394 |
| 1972-73 | 177249 | 3542 | .. | 180791 |
| 1973-74 | 172913 | 30 | .. | 172943 |
| 1974-75 | 178205 | .. | .. | 178205 |
| 1975-76 | 172288 | .. | .. | 172288 |
| 1976-77 | 215800 | 3202 | 152 | 219154 |
| 1977-78 | 202602 | 6076 | 20732 | 229410 |
| 1978-79 | 204792 | 26379 | 3793 | 234964 |

Upto 1975-76 based on A.M.A. report.
Estimates from 1976-77 onwards are based on Directorate of Coconut Development Survey.

## Conclusion

Coconut development in India gained momentum after it was brought within the purview of the National Plan from 1955-56. As a result of the combined efforts of the Centre and State Governments and the Cooperation of the multitudes of small and marginal coconut growers, there was a substantial increase in the area under the crop in most of the coconut growing states. The production also increased but not in tune with the area increase.(BS)

# Current Technical Literature

Copies of articles/documents listed in this section are available on payment of Rs.5/- for the first 5 pages or part thereof and Re.1/- for every subsequent page of the photocopy or xerox copy of the article/document. While placing the order, please mention the CTL number of the SENDOC Bulletin.

| Subject Index | CTL Nos |
|---|---|
| Chemical Industries | 638-642 |
| Electrical Industries | 663-671 |
| Electronics Industries | 672-681 |
| Energy Sources | 625-630 |
| Leather Industry | 647-653 |
| Mechanical Engineering | 654-662 |
| Packaging | 635-637 |
| Plastics | 643-646 |
| Textile & Fibre Industries | 631-634 |

## ENERGY SOURCES

625. MATHUR, H.B.: Utilisation of biogas and alcohol fuels in diesel engines. Research and Industry, 1981, 26(2), 87-94.

The Mechanical Engineering Department of the Indian Institute of Technology, Delhi, conducted extensive trials for substituting diesel oil in engines. The field experiments have shown that these two fuels can successfully replace diesel oil in diesel engines operating in agricultural and road transport sectors, with very little or minor modifications made on the design of the engines.(AA)

626. MYLES, A.S. & DAS, R.K.: Built-in solar fabric drier. Invention Intelligence, 1980, 15(4), 157-158.

Reports development of a solar fabric drier designed to facilitate drying of fabrics in small scale textile printing units.

627. SHUKLA, N.P.: Energy storage systems. Chemical Age of India, 1980, 31(11), 1117-1119.

Briefly deals with different types of energy sources and storage of energy from electrical, thermal and solar systems in detail. Emphasis has been given to various types of batteries to store or convert the energy in different forms.

628. SRINIVASAMURTHY, S. & KRISHNA MURTHY, M.V.: A study of solar operated refrigeration system. Urja, 1980, 8(6), 271-276.

The status of technologies to the utilisation of solar energy for producing cold through vapour compression, vapour absorption and vapour jet refrigeration systems is reviewed and the various associated problems are identified. Different solar energy collection techniques suitable for refrigeration applications are discussed.(AA)

629. SUNDARAM, P.S.N.: Alternate fuels for engines. Research and Industry, 1981, 26(2), 95-100.

Field trials with SVC 5, single-cylinder, high speed diesel engines have been conducted by Cooper Engineering Ltd., substituting alcohol, gobar gas and LPG, one by one, for diesel oil. The experiments have shown that the engines can be successfully operated with one of the three alternate fuels after making minor modifications in their design.(AA)

630. TASGAONKAR, G.S.: Improving the efficiency of domestic water heaters. Invention Intelligence, 1980, 15(10-12), 468-470.

The efficiency of water heaters used in Indian homes is quite low. The author discusses the causes for low efficiency and suggests practical modifications in design of heaters, old and new.

## TEXTILE AND FIBRE INDUSTRIES

631. -----: The Golden fibre of India, DIC Newsletter, 1981, (38), 5, 6, 8.

Coir industry plays an important role in the national economy, providing employment to over half-a-million people in rural India. The status and production statistics in the states of Kerala, Tamil Nadu, Karnataka and Andhra Pradesh, newer uses for coir, training programmes conducted by Coir Board to artisans and entrepreneurs and modernisation of processing and innovations in machinery are dealt with.(JBS)

632. PILLAI, C.K.S. et al: Coconut as a resource for materials and energy in the future. Journal of Scientific and Industrial Research, 1981, 40(3), 154-165.

Coconut palm offers a vast renewable resource of lignocellulosic materials in the tropical areas. Though all parts of the tree have some use or the other, they are underutilized and/or improperly used. This review (1) deals with the conventional uses of the various components of the coconut tree, (2) identifies some of the major problems facing their utilization, and (3) projects various technological opportunities for appropriate utilization of the coconut tree for materials and energy. Two fine mapping charts are presented to identify the immediate, near-term and long-term future research priorities and policy imperatives and technological opportunities on the utilization of the coconut tree.(AA)

633. SATYANARAYANA, K.G. et al: Potential of natural fibres as a resource for industrial materials in Kerala. Journal of Scientific and Industrial Research, 1981, 40(4), 222-237.

This paper lists the availability of some of the natural fibres in Kerala such as coconut, banana, sisal, talipot, palmyrah, screwpine and pineapple, catalogues their known properties and present uses with a view of focussing attention on this abundant resources of materials.

Study of properties of these fibres will help in identifying new promising areas where further exploration is required. Future research imperatives to achieve diversification of products based on these fibres are also listed. Statistics on production of fibres and export are also given.

634. THAMPAN, P.K.: Technological yield constraints in coconut culture in Kerala state and strategy for improving productivity. Indian Coconut Journal, 1980, 11(8), 1-7.

## PACKAGING

635. -----: Polyethylene polystyrene polypropylene urea and phenolic caps for packaging. Paperprint Pack India, 1981, 19(1), 59-62.

Polyethylene, polystyrene, polypropylene, urea, and phenolic caps have been around for some time. What is currently noteworthy, however, is that the performance characteristics of several of these materials are getting new emphasis and new designs. These mark significant departures from the traditional, lined, continuous thread (CT) cap.

636. -----: Statistical profile for packaging materials. Industrial Researcher, 1980, 7(1), 32-33.

Tabulates production, installed capacity, exports and imports of aluminium foil, bottles & vials, small drums, oil barrels, tin containers, HDPE, LDPE, Aluminium collapsible tubes and rigid tubes.(JBS)

637. SHETTY, N.S.: Packaging industry - An economic analysis. Industrial Researcher, 1980, 7(1), 34-38.

Discusses the role of packaging in the Indian economy and the scope for future development and profitable commercial application, both in the sphere of materials and packages. Gives in tabular form the type of packaging materials consumed by large and small scale industries and the relation between different packaging material values and output value of the consuming industries.(JBS)

## CHEMICAL INDUSTRIES

638. KHARBANDA, O.P.: Indian chemical industry 1979 & 1980 - A stock taking. Chemical Industry News, 1981, 15(9), 678-683.

Indian chemical industry is considered in the context of India's economy as also of international economy. For, no industry and/or country can operate in isolation. Political factors have an important bearing on economic matters and are therefore briefly discussed. A combination of several adverse factors have led to the present grim picture. But Indian economy in general and the chemical industry in particular have an inherent resilience. A smart recovery is forecast for the early 80's.

639. RAMADURAI, V.: Alkali industry in Maharashtra. Chemical Engineering World, 1981, 16(3), 76-84.

Reviews the status of the caustic soda and soda ash industry in Maharashtra giving statistics of capacity, production, estimated requirements for caustic soda by various sectors from 1966 to 1980. Examines the power position and price trends in Maharashtra. Also highlights the supply position and price trends of raw materials for alkali industry.(BS)

640. THAKKAR, J.L.: Prospects for industrial growth in Maharashtra in the 80's. Chemical Age of India, 1981, 16(3), 71-75.

Examines the scope for industrial growth in Maharashtra on the basis of consumption pattern of sulphuric acid and consumption of phosphatic fertilisers.

641. TOOHIL, J.P.: Energy saving methods for producing distilled water. Chemical Age of India, 1980, 31(9), 981-984.

The distillation process is summarized for several types of stills. The basic parameters for selecting a still are discussed in light of expansion and production capabilities, capital and operating costs, and maintenance requirements.(AA)

642. VAIDYANATHAN, K.: Aromatic fine/perfumery chemicals - synthetics.(1). Chemisphere, 1980, 5(29), 32-34.

Gives the occurence, manufacture and market for acetophenone and para methyl acetophenone.(BS)

PLASTICS

643. -----: A feasibility study on Bi-Axially oriented polypropylene film (BOPP). Industrial Researcher, 1980, 7(1), 21-30.

Deals with various materials used in the packaging industry and infers that by 1982-83, the demand for BOPP film will be of the order of 6600 tonnes. Analyses the market prospects of this film and the profitability for a 800 tonnes per annum plant.(JBS)

644. -----: Polymer industry enters challenging phase but still scope for opportunity. Chemical Weekly, 1981, 26(23), 78-80.

Examines the possible alternatives for polymers and highlights the role that polymers can play and their scope.(MSR)

645. -----: A view of spectacle frame industry. Chemisphere, 1981, 5(41), 22.

Presents an overview of the spectacle frame industry in India and anticipates bright future.(MSR)

646. POWELL, D.: Marketing reinforced plastics in the building and construction industry. Popular Plastics & Rubber, 1980, 25(9), III-X, XII.

Gives the statistical picture of the growth of the use of reinforced plastics in buildings and construction from 1959 to 1968. Highlights the competition for reinforced plastics, the concept of marketing and market orientation. Indicates the bases of a marketing programme for the building industry, and some suggestions for deeper market penetration.(KSDR)

## LEATHER INDUSTRY

647. -----: Export potentiality for leather and leather goods. Industrial Researcher, 1980, 7(1), 13-20.

Analyses the past and present trends in India's exports of leather and leather goods with the object of finding out their growth and direction. Gives in tabular form the capacity and production of leather and leather products in organised sector from 1974 to 1978, and exports from 1972 to 1979.(JBS)

648. -----: Footwear industry - retail outlet gradually changing. Leather Markets, 1981, 10(7), 21-23.

Reviews the new developments in retail trade of foot wear industry.

649. -----: Production of garment leathers. Leather Markets, 1981, 10(9), 37.

650. BERG, J: Marketing strategies for leather and leather products. Leathers, 1981, 22(1), 21-23.

Studies the marketing strategies mainly from a company level and from the export marketing point of view, specifically taking into consideration the developing countries problems and prospects in marketing of leather and leather products.

651. JAYARAMAN, K.S. et al.: Shoe suede from buffalo hides using chrome silica combination tannage. Leather Science, 1980, 27(7), 231-234.

652. PUVANAKRISHNAN, R. et al.: Comparative studies on bating using immobilized pancreatic enzyme product and pancreatin bate for the manufacture of glace kid. Leather Processing, 1980, 4(1), 15-19.

A new bating process for the manufacture of glace kid using immobilized panceratic enzyme product has been described in detail. The efficient reuse of the same immobilized enzyme product successively thrice has been demonstrated. The immobilized enzyme product has been found to retain almost the original level of activity after the first use and slight decrease in enzyme potency has been observed after the second and third use. Microscopical features of the bated pelts, physical and chemical analyses of the finished leathers produced by using immobilized enzyme product are comparable with those of pancreatin bate-treated leathers. The advantages of using immobilized enzyme products over soluble enzyme agents for bating have been discussed.(AA)

653. RANGANATHAN, T.S.: Production of upper leathers by partially substituting chrome by Aluminium and Zirconium salts. Leather Processing, 1981, 4(8), 21.

## MECHANICAL ENGINEERING

654. DAS, D.R.: Design of machine tools structure using model techniques. Machine Building Industry, 1980, 19(5), 17-19.

Discusses how the use of models can be a 'tool' to aid the design of machine tool elements and structure. Advantages and limitations of using model techniques in the analysis/design of machine tools structures are clearly indicated.(CS)

655. KAUSTUBHAN, B.S.: Profile tracing lathe attachment. Invention Intelligence, 1980, 15(10-12), 462-463.

The device facilitates accurate form-turning of jobs of any complicated shape, both on internal and external surfaces.

656. PALANDE, S.V.: Project management, scheduling and technology development. Chemical Engineering World, 1981, 16(3), 89-99.

Highlights the project management in principle, including the methods and important areas in the actual management. Considers briefly the aspects of technology development as they affect the chemical industry in particular.(BS)

657. PAXTON, R.R.: Power transmission. Sleeve bearings for high-temperature applications. Engineers' Digest, 1980, 41(11), 9-12.

Over the past 20 years, great advances have been made in the development of bearing liners suitable for use at temperatures above 400°F, and design problems have largely been worked out. Discusses some of the latest of these materials and associated design considerations.

658. SHASTRI, D.K. & KALIA, V.: Indigenous development of cable making machinery - a case of technology transfer. Invention Intelligence, 1981, 16(1), 17-23.

The success of technological innovations mainly depends on three factors: (i) scientific and technological capability; (ii) market/user demand; and (iii) industry/agent which converts this technology into goods and services to satisfy the demand. Persons connected with each of these areas work with different motivations and objectives. The process of technology transfer therefore, necessarily involves different mechanism and linkages to satisfy the needs of all these groups. The case study of the behavioural and technological problems involved in technology transfer from laboratory (viz CMERI) to mechanical engineering firms is discussed.(JPS)

659. SOUTHALL, J.T. & LAW, T.D.: Approaches to improved job scheduling in foundries. British Foundryman, 1980, 73(10), 287-291.

Explains the applications, significance and characteristic of scheduling in foundry industries.(SS)

660. SUBBA RAO, B.K.: Vigyan - the wickless kerosene stove for domestic use. Invention Intelligence, 1981, 16(5), 221-223.

The new domestic stove, which operates with a thermal efficiency of 60% at a kerosene consumption rate of 120 ce/hr, gives practically trouble free service and requires very little maintenance.

661. SUBRAMANYAM, S.: Bullock-operated falling-weight driven water pump. Invention Intelligence, 1980, 15(10-12), 453-457.

The proposed pump is designed to utilize the falling weight of the animal rather than its muscular power, which makes for greater efficiency with very little animal fatigue. If this system is popularized, the millions of milch-breed bullocks, which are considered to be poor work-animals, could be effectively utilized for water-lifting.

662. ZACHARIA, J. et al.: Greasing of bearings. The Indian Textile Journal, 1981, 91(4), 113-115.

Since many textile machines operate under conditions of high humidity, it is desirable that grease used should have the required stability. The correct alignment of the bearing is also a matter of obvious importance in preventing overheating and wear. An attempt has been made in this paper to focus all aspects of grease selection and care.(AA)

## ELECTRICAL INDUSTRIES

663. JOHN, T.J.: Solid-state automatic voltage regulator. Invention Intelligence, 1980, 15(10-12), 464-467.

Useful for domestic and industrial electrical equipment this true solid-state device has not a single moving part in its circuitry. The invention which is being patented, is available for commercial exploitation.

664. KANITKAR, V.J.: Technology support for switchgear design IEMA Journal, 1981, 1(5), 11-17.

Highlights different facets of technological supports basic as well as supplementary to the various aspects of switchgear industry.(MVS)

665. KRAUS, K.: Designing with solid-state analogue switches. Electronics Industry, 1980, 6(5), 31 & 33.

Describes some applications of the analogue switches which operate into the MHZ region and facilitate the simulation of high value resistors by the rapid switching of small capacitor.(VVR)

666. KUMAR, K. & RAMAKRISHNA.: Prediction of faults and prevention of transformer failures by gas-in-oil analysis. Electrical India, 1981, 21(8), 35-41.

Deals with causes of gas formation, extraction of gases from the oil, analysis of gases by gas chromatography and detection of typical faults.

667. MITTAL, M.L. & SHRIVASTAVA, S.K.: Medium power transformer with aluminium winding. Electrical India, 1981, 21(8), 25-30.

Though copper has been replaced by aluminium conductor in distribution transformers quite some time ago, there was no substantial progress of the same in the field of medium power transformers of high voltage ratings. BHEL Bhopal took the lead and developed a 20 MVA 132/33/11 kV power transformer. The transformer has passed all routi and type tests in addition to a special overload test.

In this article the various properties of both copper and aluminium have been compared. The main design considerations like conductor specification, design of winding, percentage reactance, etc. have also been discussed. Comparative study of material weight for both copper wound and aluminium wound 20 MVA transformer has been made. Manufacturing problems and quality control aspects have also been discussed.

668. PARDHANANI, R.G.: Alternatives to non-inflammable liquid filled transformers. Electrical India, 1981, 21(8), 13-16.

With the growth of industry in the last 50 years, engineers have found it economical to install smaller transformers near the load centres. These transformers are required to be essentially non-inflammable. Askarel filled transformers have been meetingthis requirement for the last 40 years. Recently, it has been found that Askarel has some severe disadvantages in ecological and environmental terms. This article explains the available alternatives and highlights the suitability of dry type transformers for Indian conditions.

669. SHARMA, C.M.: Erection, commissioning & maintenance of power transformers. Electrical India, 1981, 21(8), 47-58.

670. SHARMA, P.S.: Control voltage andtransformer for MCCs. Electrical India, 1981, 21(8), 43-46.

671. SUBRAMONIAN, S.: Maintenance and repairs of transformers. Electrical India, 1981, 21(8), 59-63.

## ELECTRONICS INDUSTRIES

672. BARTO, R. et al.: A computer architecture for digital logic simulation. Electronic Engineering, 1981, 52(642), 35, 36, 41, 45, 47, 50, 54, 56, 60, 63, 66.

Presents design for a high performance hardware simulator, which may help solve some of the future problems due to changing technologies and increased usage of LSI and VLSI. (AA)

673. DANCE, M.: Developments in optoelectronic devices. Electronics Industry, 1980, 6(8), 33.

Reviews the recent developments in the major opto 'products such as LED indicators, optoisolators and infrared devices and gives the important marketing trends for fibre optics and some specialized devices like image sensors.(VVR)

674. FODOR, G.T.: Semiconductors. Electronics Industry, 1980, 6(7), 24-25, 28, 29.

Briefly explains the construction and structure of conventional schottky rectifiers, high temperature schottkys, and IR Schottry rectifiers. Gives a comparison table of 150°C and 175°C rectifiers. Also gives the characteristics of all the above mentioned rectifiers with graph.(VVR)

675. GOLBECK, B.J.: Rotary switches. Electronic Products Magazine, 1981, 23(8), 51-54.

Explains the trends, constructional details and design of rotary switches which are used in many applications. (VVR)

676. NICHOLSON, B.: UHF and SHF semiconductors. Electronics Industry, 1980, 6(11), 41, 43, 45, 47 & 49.

Briefly describes various (FETS) field effect transistors namely Gallium arsenide FETS, low noise FETS, power FETS, Dualgate FETS, Monolithic GaAs ICs etc. which are replacing the bipolar transistors in the microwave region.(VVR)

677. NICHOLSON, B.: Single-chip microcomputers-designers' dream or compromise? Electronics Industry, 1980, 6(7), 49-51, 53, 55, 57, 59, 61.

Gives brief introduction of commercially available microcomputers. Explains few general points worth remembering before embarking on a microcomputer project and the selection criteria of various single-chip microcomputers which are used for oven controlling, washing machines, cookers, calculators, TV-games, automobiles etc.(VVR)

678. SANDERSON, A.C.: Failure mechanisms in tantalum capacitors. Electronic Industry, 1980, 6(11), 57-59.

Briefly explains the manufacturing process, failure defects and problems of tantalum capacitors and gives some of the typical electrical properties of these capacitors.(VVR)

679. TRIPATHI, R.C.: Status and scope of small scale sector in electronics. Electronics Information & Planning, 1980, 7(11), 743-755.

Surveys in quantitative terms the present contribution of the small scale industry sector in the overall production of various subsectors of electronics industry. Identifies its areas of strength and the items which have scope for growth. Presents the various promotional efforts being undertaken by the Union and state governments

680. TRIPATHI, R.C.: A strategy for modernisation of plants for electronic component industry. **Electronics Information & Planning**, 1980, 7(8), 533-557.

Examines typical difficulties of component users, technological aspects of existing production base and gaps for the components used for the growth of electronics industry. Brings out an approach for modernisation of the components industry through optimal mix of technology development efforts and encouragement for import of modern production equipment from abroad. Gives the summary of qualified product list for electronic components and list of high demand capital equipment needing indigenisation for the component industry etc. in tabular form.(VVR)

681. WALTON, A.: Developments in connectors - as good as gold. Electronics Industry, 1980, 6(5), 71. 73, 75, 77, 79, 81, 83 & 85.

Examines some new ranges and individual products, such as Elastomeric connectors, RF connectors and fibre-optic connectors etc. and looks at where the connector manufacturer is concentrating his development effort; substitutes for gold as a contact material plastics for connectors, with an eye to fire retardancy and the optical fibre connector.(VVR)

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